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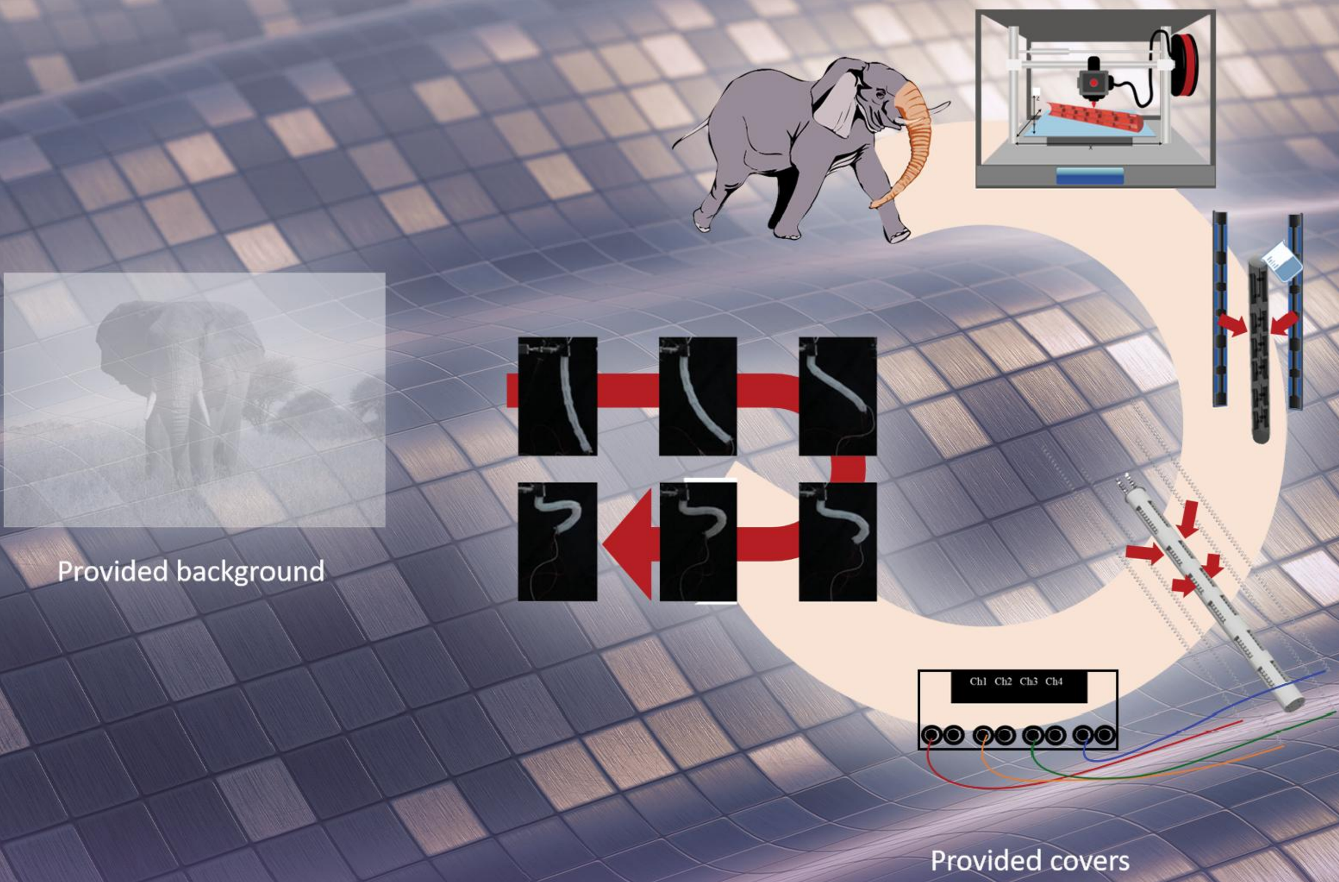

A Shape Memory Alloy-Based Soft Actuator Mimicking an Elephant's Trunk

Volume 15 · Issue 5 | March (I) 2023

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Polymers, Volume 15, Issue 5 (March-1 2023) – 267 articles

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Synthesis of Calcium Peroxide Nanoparticles with Starch as a Stabilizer for the Degradation of Organic Dye in an Aqueous Solution (/2073-4360/15/5/1327)

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Polymers **2023**, *15*(5), 1327; https://doi.org/10.3390/polym15051327 (https://doi.org/10.3390/polym15051327) - 06 Mar 2023

Abstract One of the most significant environmental problems in the world is the massive release of dye wastewater from the dyeing industry. Therefore, the treatment of dyes effluents has received significant attention from researchers in recent years. Calcium peroxide (CP) from the group of **[...] Read more.**
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Geometric Analysis of Three-Dimensional Woven Fabric with in-Plane Auxetic Behavior (/2073-4360/15/5/1326)

by
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Polymers **2023**, *15*(5), 1326; https://doi.org/10.3390/polym15051326 (https://doi.org/10.3390/polym15051326) - 06 Mar 2023

Abstract Auxetic textiles are emerging as an enticing option for many advanced applications due to their unique deformation behavior under tensile loading. This study reports the geometrical analysis of three-dimensional (3D) auxetic woven structures based on semi-empirical equations. The 3D woven fabric was developed **[...] Read more.**
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Crosslinking Rapidly Cured Epoxy Resin Thermosets: Experimental and Computational Modeling and Simulation Study (/2073-4360/15/5/1325)

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Polymers **2023**, *15*(5), 1325; https://doi.org/10.3390/polym15051325 (https://doi.org/10.3390/polym15051325) - 06 Mar 2023

Abstract The power of computational modeling and simulation for establishing clear links between materials' intrinsic properties and their atomic structure has more and more increased the demand for reliable and reproducible protocols. Despite this increased demand, no one approach can provide reliable and reproducible **[...] Read more.**
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Design of New Dispersants Using Machine Learning and Visual Analytics (/2073-4360/15/5/1324)

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Abstract Artificial intelligence (AI) is an emerging technology that is revolutionizing the discovery of new materials. One key application of AI is virtual screening of chemical libraries, which enables the accelerated discovery of materials with desired properties. In this study, we developed computational models [...] Read more.
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Polymers **2023**, *15*(5), 1322; **https://doi.org/10.3390/polym15051322 (https://doi.org/10.3390/polym15051322)** - 06 Mar 2023

Abstract One of the major goals of vascular tissue engineering is to develop much-needed materials that are suitable for use in small-diameter vascular grafts. Poly(1,8-octamethylene citrate) can be considered for manufacturing small blood vessel substitutes, as recent studies have demonstrated that this material is **[...] Read more.**
(This article belongs to the Special Issue **Polymer Scaffolds for Tissue Engineering II (/journal/polymers/special_issues/04D832UIOY)**)

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Open Access Article **(/2073-4360/15/5/1321/pdf?version=1678100009)**

Solvent-Evaporation-Induced Synthesis of Graphene Oxide/Peptide Nanofiber (GO/PNF) Hybrid Membranes Doped with Silver Nanoparticles for Antibacterial Application (/2073-4360/15/5/1321)

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Polymers **2023**, *15*(5), 1321; **https://doi.org/10.3390/polym15051321 (https://doi.org/10.3390/polym15051321)** - 06 Mar 2023

Abstract Designing functional membranes through the collaboration of multi-dimensional nanomaterials is of particular interest in environmental and biomedical applications. Herein, we propose a facile and green synthetic strategy by collaborating with graphene oxide (GO), peptides, and silver nanoparticles (AgNPs) to synthesize functional hybrid membranes **[...] Read more.**
(This article belongs to the Special Issue **Recent Trends in Polymer Membranes: Fabrication Technique, Characterization, Functionalization, and Applications in Environmental Science (/journal/polymers/special_issues/Polymer_Membranes_Fabrication_Characterization_Functionalization_Application)**)

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Open Access Article **(/2073-4360/15/5/1320/pdf?version=1678103876)**

Additive Effects of Solid Paraffins on Mechanical Properties of High-Density Polyethylene (/2073-4360/15/5/1320)

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Polymers **2023**, *15*(5), 1320; **https://doi.org/10.3390/polym15051320 (https://doi.org/10.3390/polym15051320)** - 06 Mar 2023

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Abstract In this work, two types of solid paraffins (i.e., linear and branched) were added to high-density polyethylene (HDPE) to investigate their effects on the dynamic viscoelasticity and tensile properties of HDPE. The linear and branched paraffins exhibited high and low crystallizability, respectively. The **[...] Read more.**
(This article belongs to the Section **Polymer Physics and Theory (/journal/polymers/sections/Phys_Theory)**)

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Open Access Article **(/2073-4360/15/5/1319/pdf?version=1678099643)**

Synthesis of Alginate Nanoparticles Using Hydrolyzed and Enzyme-Digested Alginate Using the Ionic Gelation and Water-in-Oil Emulsion Method (/2073-4360/15/5/1319)

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Polymers **2023**, *15*(5), 1319; **https://doi.org/10.3390/polym15051319 (https://doi.org/10.3390/polym15051319)** - 06 Mar 2023

Abstract Alginate nanoparticles (AlgNPs) are attracting increasing interest for a range of applications because of their good biocompatibility and their ability to be functionalized. Alginate is an easily accessible biopolymer which is readily gelled by the addition of cations such as calcium, facilitating a **[...] Read more.**
(This article belongs to the Section **Biomacromolecules, Biobased and Biodegradable Polymers (/journal/polymers/sections/Biomacromol_Biobased_Biodegradable_Polymers)**)

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Open Access Article **(/2073-4360/15/5/1318/pdf?version=1678095312)**

Life Cycle Environmental Impacts of a Biobased Acrylic Polymer for Leather Production (/2073-4360/15/5/1318)

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Polymers **2023**, *15*(5), 1318; **https://doi.org/10.3390/polym15051318 (https://doi.org/10.3390/polym15051318)** - 06 Mar 2023

Abstract The aim of this paper was to develop a biopolymer based on raw materials not originating from petroleum chemistry to reduce the environmental impact. To this end, an acrylic-based retanning product was designed where part of the fossil-based raw materials was replaced with **[...] Read more.**
(This article belongs to the Section **Polymer Networks (/journal/polymers/sections/netw)**)

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Open Access Article (/2073-4360/15/5/1317/pdf?version=1678094282)

Dislodgment Resistance, Adhesive Pattern, and Dentinal Tubule Penetration of a Novel Experimental Algin Biopolymer-Incorporated Bioceramic-Based Root Canal Sealer (/2073-4360/15/5/1317)

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Polymers **2023**, *15*(5), 1317; https://doi.org/10.3390/polym15051317 (https://doi.org/10.3390/polym15051317) - 06 Mar 2023

Abstract The currently available bioceramic-based sealers still demonstrate low bond strength with a poor seal in root canal despite desirable biological properties. Hence, the present study aimed to determine the dislodgment resistance, adhesive pattern, and dentinal tubule penetration of a novel experimental algin-incorporated bioactive [...] Read more.
(This article belongs to the Special Issue Biomedical Applications of Intelligent Hydrogel (/journal/polymers/special_issues/Biomedical_Applications_Intelligent_Hydrogel))

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Open Access Article (/2073-4360/15/5/1316/pdf?version=1678093195)

Enhanced Mechanical Stability and Hydrophobicity of Cellulose Aerogels via Quantitative Doping of Nano-Lignin (/2073-4360/15/5/1316)

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Polymers **2023**, *15*(5), 1316; https://doi.org/10.3390/polym15051316 (https://doi.org/10.3390/polym15051316) - 06 Mar 2023

Abstract As a porous biomass sustainable material, cellulose aerogel has attracted significant attention due to its unique properties in various applications. However, its mechanical stability and hydrophobicity are huge obstacles hindering practical applications. In this work, nano-lignin quantitative doping cellulose nanofiber aerogel was successfully [...] Read more.
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Branched Amphiphilic Polylactides as a Polymer Matrix Component for Biodegradable Implants (/2073-4360/15/5/1315) Back to TopTop

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Polymers **2023**, *15*(5), 1315; https://doi.org/10.3390/polym15051315 (https://doi.org/10.3390/polym15051315) - 06 Mar 2023

Abstract The combination of biocompatibility, biodegradability, and high mechanical strength has provided a steady growth in interest in the synthesis and application of lactic acid-based polyesters for the creation of implants. On the other hand, the hydrophobicity of polylactide limits the possibilities of its [...] Read more.
(This article belongs to the Special Issue Scaffolds and Surfaces with Biomedical Applications (/journal/polymers/special_issues/scaffolds_surfaces_biomed_appli))

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Open Access Article (/2073-4360/15/5/1314/pdf?version=1678091227)

Formation of Porous Structures and Crystalline Phases in Poly(vinylidene fluoride) Membranes Prepared with Nonsolvent-Induced Phase Separation—Roles of Solvent Polarity (/2073-4360/15/5/1314)

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Polymers **2023**, *15*(5), 1314; https://doi.org/10.3390/polym15051314 (https://doi.org/10.3390/polym15051314) - 06 Mar 2023

Abstract PVDF membranes were prepared with nonsolvent-induced phase separation, using solvents with various dipole moments, including HMPA, NMP, DMAc and TEP. Both the fraction of the polar crystalline phase and the water permeability of the prepared membrane increased monotonously with an increasing solvent dipole [...] Read more.
(This article belongs to the Section Polymer Membranes and Films (/journal/polymers/sections/Membr_Film))

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Open Access Review (/2073-4360/15/5/1313/pdf?version=1678092823)

Mechanisms of Foreign Body Giant Cell Formation in Response to Implantable Biomaterials (/2073-4360/15/5/1313)

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Polymers **2023**, *15*(5), 1313; https://doi.org/10.3390/polym15051313 (https://doi.org/10.3390/polym15051313) - 06 Mar 2023

Abstract Long term function of implantable biomaterials are determined by their integration with the host's body. Immune reactions against these implants could impair the function and integration of the implants. Some biomaterial-based implants lead to macrophage fusion and the formation of multinucleated giant cells, [...] Read more.
(This article belongs to the Special Issue **Advances in Polymer Devices for Cell Transplantation (/journal/polymers/special_issues/poly_devices_cell)**)

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Open Access Article (/2073-4360/15/5/1312/pdf?version=1678327836)

High-Content *Aloe vera* Based Hydrogels: Physicochemical and Pharmaceutical Properties (/2073-4360/15/5/1312)

by Mariana Chelu (https://sciprofiles.com/profile/2148958?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1312; https://doi.org/10.3390/polym15051312 (https://doi.org/10.3390/polym15051312) - 06 Mar 2023

Abstract The present research focuses on the physicochemical and pharmacotechnical properties of new hydrogels obtained using allantoin, xanthan gum, salicylic acid and different concentrations of *Aloe vera* (5, 10, 20% *w*/*v* in solution; 38, 56, 71 wt% in dry gels). The thermal [...] Read more.
(This article belongs to the Special Issue **Polymer Composites in Biomedical Applications II (/journal/polymers/special_issues/9XP0713AMH)**)

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Open Access Article (/2073-4360/15/5/1311/pdf?version=1678177725)

[Black Tea Extracts/Polyvinyl Alcohol Active Nanofibers Electrospun Mats with Sustained Release of Polyphenols for Food Packaging Applications (/2073-4360/15/5/1311)](/2073-4360/15/5/1311)

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Polymers **2023**, *15*(5), 1311; https://doi.org/10.3390/polym15051311 (https://doi.org/10.3390/polym15051311) - 06 Mar 2023

Abstract The efficiency in the capabilities to store and release antioxidants depends on the film morphology and its manufacturing process, as well as on the type and methodology used to obtain the polyphenol extracts. Here, hydroalcoholic extracts of black tea polyphenols (BT) were obtained **[...] Read more.**
(This article belongs to the Special Issue **Electrospun Composite Nanofibers for Functional Applications II (/journal/polymers/special_issues/Electrospun_Composite_Nanofibers_Functional_Applications_II)**)

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Open Access Article (/2073-4360/15/5/1310/pdf?version=1678081854)

Cotton Woven Fabrics as Protective Polymer Materials against Solar Radiation in the Range of 210–1200 nm (/2073-4360/15/5/1310)

by
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Polymers **2023**, *15*(5), 1310; https://doi.org/10.3390/polym15051310 (https://doi.org/10.3390/polym15051310) - 06 Mar 2023

Abstract The proposed paper describes the influence of woven fabric constructional parameters (type of weave, relative fabric density) and colouration (obtained by eco-friendly dyeing) on the solar transmittance of cotton woven fabrics in the range of 210–1200 nm. The cotton woven fabrics in their **[...] Read more.**
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Open Access Review (/2073-4360/15/5/1309/pdf?version=1678073778)

A Review of the Use of Coconut Fiber in Cement Composites (/2073-4360/15/5/1309)

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Polymers **2023**, *15*(5), 1309; **https://doi.org/10.3390/polym15051309 (https://doi.org/10.3390/polym15051309)** - 06 Mar 2023

Abstract The use of plant fibers in cementitious composites has been gaining prominence with the need for more sustainable construction materials. It occurs due to the advantages natural fibers provide to these composites, such as the reduction of density, fragmentation, and propagation of cracks **[...] Read more.**
(This article belongs to the Special Issue **Sustainable Polymer Composites from Renewable Resources: Functionality and Applications (/journal/polymers/special_issues/IL5G954949)**)

Open Access Article **(/2073-4360/15/5/1308/pdf?version=1678190727)**

Preparation and Characterization of Nanocomposite Hydrogels Based on Self-Assembling Collagen and Cellulose Nanocrystals (/2073-4360/15/5/1308)

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Polymers **2023**, *15*(5), 1308; **https://doi.org/10.3390/polym15051308 (https://doi.org/10.3390/polym15051308)** - 05 Mar 2023

Abstract Collagen (Col) hydrogels are an important biomaterial with many applications in the biomedical sector. However, deficiencies, including insufficient mechanical properties and a rapid rate of biodegradation, hamper their application. In this work, nanocomposite hydrogels were prepared by combining a cellulose nanocrystal (CNC) with **[...] Read more.**
(This article belongs to the Special Issue **Polymeric Composite Nanomaterials in Medicine (/journal/polymers/special_issues/A649AP681T)**)

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Open Access Review **(/2073-4360/15/5/1307/pdf?version=1678177392)**

Recent Advances in Degradation of Polymer Plastics by Insects Inhabiting Microorganisms (/2073-4360/15/5/1307)

by **Rongrong An (https://sciprofiles.com/profile/1213972?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1307; **https://doi.org/10.3390/polym15051307 (https://doi.org/10.3390/polym15051307)** - 05 Mar 2023

Abstract Plastic pollution endangers all natural ecosystems and living creatures on earth. Excessive reliance on plastic products and excessive production of plastic packaging are extremely dangerous for humans because plastic waste has polluted almost the entire world, whether it is in the sea or **[...] Read more.**
(This article belongs to the Special Issue **Natural-Based Biodegradable Polymeric Materials (/journal/polymers/special_issues/E0J0CM2L2D)**)

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Open Access Communication (/2073-4360/15/5/1306/pdf?version=1678009573)

Facile Synthesis of Light-Switchable Polymers with Diazocine Units in the Main Chain (/2073-4360/15/5/1306)

by Shuo Li (https://sciprofiles.com/profile/2462361?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Katrin Bamberg (https://sciprofiles.com/profile/author/WjV2b2ZlS1cvbnE4QWNxSkRYT1VvbGpGbkhidzJ1ZW9HVzYrY3gyc01IVT0=?utm_sour, Yuzhou Lu (https://sciprofiles.com/profile/author/OFN1ejJ2TjdPbHlzK0x4elYrQVdYQUdzYjM3ckdnc3dmZm12d1FjTy9zbz0=?utm_source=mdpi, Frank D. Sönnichsen (https://sciprofiles.com/profile/author/YldKbVdGMkxjVkszOTJyQVdJRHE3NHlhTU1na0s5Yjcycyt0Zk14elpmUT0=?utm_s and Anne Staubitz (https://sciprofiles.com/profile/325886?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1306; https://doi.org/10.3390/polym15051306 (https://doi.org/10.3390/polym15051306) - 05 Mar 2023

Abstract Unlike azobenzene, the photoisomerization behavior of its ethylene-bridged derivative, diazocine, has hardly been explored in synthetic polymers. In this communication, linear photoresponsive poly(thioether)s containing diazocine moieties in the polymer backbone with different spacer lengths are reported. They were synthesized in thiol-ene polyadditions between [...] Read more.

(This article belongs to the Special Issue **Stimuli-Responsive Polymers (/journal/polymers/special_issues/C20IA5ZMXJ)**)

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Open Access Article (/2073-4360/15/5/1305/pdf?version=1678090971)

All-Organic PTFE Coated PVDF Composite Film Exhibiting Low Conduction Loss and High Breakdown Strength for Energy Storage Applications (/2073-4360/15/5/1305)

by Xiang-Shuo Meng (https://sciprofiles.com/profile/author/cE5yMUpVMUFCekhpNkc0M0VEekR0Wk9nbThvU3V3WXRjNzdPTEtNNUJucz0=?utm_, Yujiu Zhou (https://sciprofiles.com/profile/2740425?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Jianfeng Li (https://sciprofiles.com/profile/author/VVVhZ3pHc3JLclliRVBRWFM2QWsvM1o0RFJZMDN6SzVYQ1RVOHdnbllRWT0=?utm_source, Hu Ye (https://sciprofiles.com/profile/author/bStscjEvWk1TNG5UczZsWUNJSUNOUT09?utm_source=mdpi.com&utm_medium=website&utm_, Fujia Chen (https://sciprofiles.com/profile/author/a3RVeUJNaElrc0xwaHdDak9kOGhpTVpmSXNFbWQwdVl0N21NT1Y5NCthWT0=?utm_source, Yuetao Zhao (https://sciprofiles.com/profile/2703526?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Qifeng Pan (https://sciprofiles.com/profile/author/N2RMcithWklrYjlyckhjc1ZCYjdYNE4xaHoxUitpT3BzWldQYnFDaHFOQT0=?utm_source=mdp and Jianhua Xu (https://sciprofiles.com/profile/759058?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1305; https://doi.org/10.3390/polym15051305 (https://doi.org/10.3390/polym15051305) - 05 Mar 2023

Abstract Plastic film capacitors are widely used in pulse and energy storage applications because of their high breakdown strength, high power density, long lifetime, and excellent self-healing properties. Nowadays, the energy storage density of commercial biaxially oriented polypropylene (BOPP) is limited by its low [...] Read more.

(This article belongs to the Section **Polymer Applications (/journal/polymers/sections/Polymer_Applications)**)

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Open Access Article (/2073-4360/15/5/1304/pdf?version=1678180231)

Facile Synthesis of Reduced-Graphene-Oxide-Modified Ammonium Polyphosphate to Enhance the Flame Retardancy, Smoke Release Suppression, and Mechanical Properties of Epoxy Resin (/2073-4360/15/5/1304)

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Polymers **2023**, *15*(5), 1304; https://doi.org/10.3390/polym15051304 (https://doi.org/10.3390/polym15051304) - 05 Mar 2023

Abstract A unique hybridized intumescent flame retardant named reduced-graphene-oxide-modified ammonium polyphosphate (RGO-APP) was successfully synthesized via the simple hydrothermal method and reduced process. Then, the obtained RGO-APP was applied in epoxy resin (EP) for flame retardancy reinforcement. The addition of RGO-APP results in a [...] Read more.
(This article belongs to the Special Issue **Advanced Research on Thermal Properties and Flame Retardancy of Polymer Composites (/journal/polymers/special_issues/3Y2277BO9J)**)

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A Study on mPPO Development and Injection Molding Process for Lightweight Stack Enclosure of FCEV (/2073-4360/15/5/1303)

by Soo-Lim Lee (https://sciprofiles.com/profile/2282342?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Jong-Hwal Kim (https://sciprofiles.com/profile/author/Q3dyNUc1WlIhU3NzTVVFN1hiUmZQcUJsQm9tYkErRkpHZ3pPZDJwdTY5cz0=?utm_sou and Seon-Bong Lee (https://sciprofiles.com/profile/1128888?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1303; https://doi.org/10.3390/polym15051303 (https://doi.org/10.3390/polym15051303) - 04 Mar 2023

Abstract The automobile industry is focused on eco-friendly vehicles with the goal of carbon neutrality (Netzero), and vehicle weight reduction is essential to achieve high fuel efficiency for driving performance and distance compared to internal combustion engines. This is important for the light-weight stack [...] Read more.
(This article belongs to the Section **Polymer Processing and Engineering (/journal/polymers/sections/Process_Eng)**)

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Bio-Based Adhesives Formulated from Tannic Acid, Chitosan, and Shellac for Packaging Materials (/2073-4360/15/5/1302)

by

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Polymers **2023**, *15*(5), 1302; **https://doi.org/10.3390/polym15051302 (https://doi.org/10.3390/polym15051302)** - 04 Mar 2023

Abstract The aim of this study was to develop bio-based adhesives that can be used for various packaging papers. In addition to commercial paper samples, papers produced from harmful plant species in Europe, such as Japanese Knotweed and Canadian Goldenrod, were used. In this **[...] Read more.**

(This article belongs to the Special Issue **Biomass-Derived Polymers II (/journal/polymers/special_issues/biomass_derived_polymers_ii)**)

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Investigation of Performance of Anion Exchange Membrane (AEM) Electrolysis with Different Operating Conditions (/2073-4360/15/5/1301)

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Polymers **2023**, *15*(5), 1301; https://doi.org/10.3390/polym15051301 (https://doi.org/10.3390/polym15051301) - 04 Mar 2023

Abstract In this work, the performance of anion exchange membrane (AEM) electrolysis is evaluated. A parametric study is conducted, focusing on the effects of various operating parameters on the AEM efficiency. The following parameters—potassium hydroxide (KOH electrolyte concentration (0.5–2.0 M), electrolyte flow rate (1–9 [...] Read more.
(This article belongs to the Special Issue Recent Trends in Polymer Membranes: Fabrication Technique, Characterization, Functionalization, and Applications in Environmental Science (/journal/polymers/special_issues/Polymer_Membranes_Fabrication_Characterization_Functionalization_Application))

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Improvement of Heat Resistance of Fluorosilicone Rubber Employing Vinyl-Functionalized POSS as a Chemical Crosslinking Agent (/2073-4360/15/5/1300)

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Polymers **2023**, *15*(5), 1300; https://doi.org/10.3390/polym15051300 (https://doi.org/10.3390/polym15051300) - 04 Mar 2023

Abstract Fluorosilicone rubber (F-LSR) is a promising material that can be applied in various cutting-edge industries. However, the slightly lower thermal resistance of F-LSR compared with that of conventional PDMS is difficult to overcome by applying nonreactive conventional fillers that readily agglomerate owing to [...] Read more.
(This article belongs to the Collection Silicon-Containing Polymeric Materials (/journal/polymers/topical_collections/Si_Polym))

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Open Access Article (/2073-4360/15/5/1299/pdf?version=1678257190)

On the Vibration-Damping Properties of the Prestressed Polyurethane Granular Material (/2073-4360/15/5/1299)

by Aleš Gosar (https://sciprofiles.com/profile/2732230?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Igor Emri (https://sciprofiles.com/profile/author/bzMrbkRWbEtjc3NvUXBTVStML1ZqUT09?utm_source=mdpi.com&utm_medium=website&utm
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Polymers **2023**, *15*(5), 1299; https://doi.org/10.3390/polym15051299 (https://doi.org/10.3390/polym15051299) - 04 Mar 2023

Abstract Granular materials promise opportunities for the development of high-performance, lightweight vibration-damping elements that provide a high level of safety and comfort. Presented here is an investigation of the vibration-damping properties of prestressed granular material. The material studied is thermoplastic polyurethane (TPU) in Shore [...] Read more.
(This article belongs to the Section Polymer Applications (/journal/polymers/sections/Polymer_Applications))

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Open Access Article (/2073-4360/15/5/1298/pdf?version=1677903777)

Fabrication of Novel Omeprazole-Based Chitosan Coated Nanoemulgel Formulation for Potential Anti-Microbia; In Vitro and Ex Vivo Characterizations (/2073-4360/15/5/1298)

by Irshad Ullah (https://sciprofiles.com/profile/2475973?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Aiyeshah Alhodaib (https://sciprofiles.com/profile/1767429?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Iffat Naz (https://sciprofiles.com/profile/1449342?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Waqar Ahmad (https://sciprofiles.com/profile/author/SUFtWDM2M3I0UWZFZGNha0R5eGt5STEwV2d1MEc4VDBPVFB6UHpldXI5OD0=?utm_sou
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Polymers **2023**, *15*(5), 1298; https://doi.org/10.3390/polym15051298 (https://doi.org/10.3390/polym15051298) - 04 Mar 2023

Abstract Infectious diseases remain inevitable factors for high mortality and morbidity rate in the modern world to date. Repurposing is a novel approach to drug development has become an intriguing research topic in the literature. Omeprazole is one of the top ten proton pump **[...] Read more.**
(This article belongs to the Special Issue **Chitosan-Based Coatings for Food, Pharmaceutical and Medical Applications (/journal/polymers/special_issues/510B7Z0740)**)

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Open Access Article **(/2073-4360/15/5/1297/pdf?version=1677861844)**

Structural and Biochemical Characterization of Silver/Copper Binding by *Dendrorhynchus zhejiangensis* Ferritin (/2073-4360/15/5/1297)

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Polymers **2023**, *15*(5), 1297; **https://doi.org/10.3390/polym15051297 (https://doi.org/10.3390/polym15051297)** - 03 Mar 2023

Abstract Ferritin with a highly symmetrical cage-like structure is not only key in the reversible storage of iron in efficient ferroxidase activity; it also provides unique coordination environments for the conjugation of heavy metal ions other than those associated with iron. However, research regarding **[...] Read more.**
(This article belongs to the Section **Biomacromolecules, Biobased and Biodegradable Polymers (/journal/polymers/sections/Biomacromol_Biobased_Biodegradable_Polymers)**)

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Open Access Article **(/2073-4360/15/5/1296/pdf?version=1678094318)**

Polymer-Based Conductive Nanocomposites for the Development of Bioanodes Using Membrane-Bound Enzyme Systems of Bacteria *Gluconobacter oxydans* in Biofuel Cells (/2073-4360/15/5/1296)

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Polymers **2023**, *15*(5), 1296; https://doi.org/10.3390/polym15051296 (https://doi.org/10.3390/polym15051296) - 03 Mar 2023

Abstract The development of biofuel cells (BFCs) currently has high potential since these devices can be used as alternative energy sources. This work studies promising materials for biomaterial immobilization in bioelectrochemical devices based on a comparative analysis of the energy characteristics (generated potential, internal [...] Read more.
(This article belongs to the Special Issue **Synthesis and Applications of Polymer-Based Nanocomposites (/journal/polymers/special_issues/polymer_based_nanocomposites)**)

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Open Access Article (/2073-4360/15/5/1295/pdf?version=1677849215)

Ag–Cellulose Hybrid Filler for Boosting the Power Output of a Triboelectric Nanogenerator (/2073-4360/15/5/1295)

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Polymers **2023**, *15*(5), 1295; https://doi.org/10.3390/polym15051295 (https://doi.org/10.3390/polym15051295) - 03 Mar 2023

Abstract The triboelectric nanogenerator (TENG) is a newly developed energy harvesting technology that can convert mechanical energy into electricity. The TENG has received extensive attention due to its potential applications in diverse fields. In this work, a natural based triboelectric material has been developed [...] Read more.
(This article belongs to the Section **Polymer Composites and Nanocomposites (/journal/polymers/sections/polymer_composites_nanocomposites)**)

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Open Access Review (/2073-4360/15/5/1294/pdf?version=1677847161)

Effect of Sulfonated Inorganic Additives Incorporated Hybrid Composite Polymer Membranes on Enhancing the Performance of Microbial Fuel Cells (/2073-4360/15/5/1294)

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Polymers **2023**, *15*(5), 1294; https://doi.org/10.3390/polym15051294 (https://doi.org/10.3390/polym15051294) - 03 Mar 2023

Abstract Microbial fuel cells (MFCs) provide considerable benefits in the energy and environmental sectors for producing bioenergy during bioremediation. Recently, new hybrid composite membranes with inorganic additives have been considered for MFC application to replace the high cost of commercial membranes and improve the [...] Read more.
(This article belongs to the Special Issue Polymers for Energy and Environmental Applications (/journal/polymers/special_issues/polym_energy_environment))

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Open Access Article (/2073-4360/15/5/1293/pdf?version=1678100164)

Investigation on Centrifugally Spun Fibrous PCL/3-Methyl Mannoside Mats for Wound Healing Application (/2073-4360/15/5/1293)

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Polymers **2023**, *15*(5), 1293; https://doi.org/10.3390/polym15051293 (https://doi.org/10.3390/polym15051293) - 03 Mar 2023

Abstract Fibrous structures, in general, have splendid advantages in different forms of micro- and nanomembranes in various fields, including tissue engineering, filtration, clothing, energy storage, etc. In the present work, we develop a fibrous mat by blending the bioactive extract of Cassia auriculata (CA) [...] Read more.
(This article belongs to the Special Issue Advanced Functional Polymeric Materials for Biomedical Applications (/journal/polymers/special_issues/40K5F2F76X))

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Open Access Article (/2073-4360/15/5/1292/pdf?version=1678350036)

Effects of Process Parameters on the Fibrous Structure and Textural Properties of Calcium Caseinate Extrudates (/2073-4360/15/5/1292)

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Polymers **2023**, *15*(5), 1292; https://doi.org/10.3390/polym15051292 (https://doi.org/10.3390/polym15051292) - 03 Mar 2023

Abstract Textured calcium caseinate extrudates are considered promising candidates in producing fish substitutes. This study aimed to evaluate how the moisture content, extrusion temperature, screw speed, and cooling die unit temperature of the high-moisture extrusion process affect the structural and textural properties of calcium [...] Read more.
(This article belongs to the Special Issue **Biopolymers: Structure-Function Relationship and Application II (/journal/polymers/special_issues/RUO1UMR733)**)

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Phosphazene Functionalized Silsesquioxane-Based Porous Polymer as Thermally Stable and Reusable Catalyst for Bulk Ring-Opening Polymerization of ε-Caprolactone (/2073-4360/15/5/1291)

by
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Polymers **2023**, *15*(5), 1291; https://doi.org/10.3390/polym15051291 (https://doi.org/10.3390/polym15051291) - 03 Mar 2023

Abstract The bulk ring-opening polymerization (ROP) of ε-caprolactone using phosphazene-containing porous polymeric material (HPCP) has been studied at high reaction temperatures (130–150 °C). HPCP in conjunction with benzyl alcohol as an initiator induced the living ROP of ε-caprolactone, affording polyesters with a controlled molecular [...] Read more.
(This article belongs to the Collection **Polymerization and Kinetic Studies (/journal/polymers/topical_collections/Polymerization_Kinetic_Studies)**)

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Energy Consumption Modeling of 3D-Printed Carbon-Fiber-Reinforced Polymer Parts (/2073-4360/15/5/1290)

by
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Polymers **2023**, *15*(5), 1290; https://doi.org/10.3390/polym15051290 (https://doi.org/10.3390/polym15051290) - 03 Mar 2023

Abstract Three-dimensionally printed carbon-fiber-reinforced polymer (3DP-CFRP) has become an important contributor to commercialized additive manufacturing. Due to carbon fiber infills, the 3DP-CFRP parts can enjoy highly intricate geometry, enhanced part robustness, heat resistance, and mechanical properties. With the rapid growth of 3DP-CFRP parts in [...] Read more.
(This article belongs to the Special Issue Fibre Reinforced Polymer (FRP) Composites in Structural Applications (/journal/polymers/special_issues/Fibre_Reinf_Polym_Compos_Struct_Appl))

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Copper II Complexes Based on Benzimidazole Ligands as a Novel Photoredox Catalysis for Free Radical Polymerization Embedded Gold and Silver Nanoparticles (/2073-4360/15/5/1289)

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Polymers **2023**, *15*(5), 1289; https://doi.org/10.3390/polym15051289 (https://doi.org/10.3390/polym15051289) - 03 Mar 2023

Abstract The copper II complex's novel benzimidazole Schiff base ligands were manufactured and gauged as a new photoredox catalyst/photoinitiator amalgamated with triethylamine (TEA) and iodonium salt (Iod) for the polymerization of ethylene glycol diacrylate while exposed to visible light by an LED Lamp at [...] Read more.
(This article belongs to the Special Issue Polymers Synthesis and Characterization II (/journal/polymers/special_issues/IB4Y5MAPZL))

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Drying Process of Waterborne Paint Film on Bamboo Laminated Lumber for Furniture (/2073-4360/15/5/1288)

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Polymers **2023**, *15*(5), 1288; https://doi.org/10.3390/polym15051288 (https://doi.org/10.3390/polym15051288) - 03 Mar 2023

Abstract In this study, bamboo laminated lumber for furniture was coated with waterborne acrylic paints. The effects of different environmental conditions (including temperature, humidity and wind speed) on the drying rate and performance of the waterborne paint film were investigated. Then, the drying process **[...] Read more.**

(This article belongs to the Special Issue **Processing and Manufacturing of Wood-Based Composites (/journal/polymers/special_issues/D9S6W87JVW)**)

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The Effects of rGO Content and Drying Method on the Textural, Mechanical, and Thermal Properties of rGO/Polymer Composites (/2073-4360/15/5/1287)

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Polymers **2023**, *15*(5), 1287; https://doi.org/10.3390/polym15051287 (https://doi.org/10.3390/polym15051287) - 03 Mar 2023

Abstract Composite hydrogels samples consisting of poly(methyl methacrylate/butyl acrylate/2-hydroxyethylmethacrylate) (poly-OH) and up to 60% reduced graphene oxide (rGO) containing rGO were synthesized. The method of coupled thermally induced self-assembly of graphene oxide (GO) platelets within a polymer matrix and in situ chemical reduction of **[...] Read more.**

(This article belongs to the Special Issue **Structure-Property Relationship of Polymer Materials (/journal/polymers/special_issues/structure_property_polymer)**)

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Open Access Article (/2073-4360/15/5/1286/pdf?version=1680271189)

Microscopic Mechanism of Electrical Aging of PVDF Cable Insulation Material (/2073-4360/15/5/1286)

by Zhiyi Pang (https://sciprofiles.com/profile/2802597?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Yi Li (https://sciprofiles.com/profile/848169?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Hanbo Zheng (https://sciprofiles.com/profile/53522?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Rui Qin (https://sciprofiles.com/profile/author/WkppUzlTaisxUFNCVStQT3BkNUVHTTBDdXF0aFdmWWJhcVBNRDVlU0FsTT0=?utm_source=m
Polymers **2023**, *15*(5), 1286; https://doi.org/10.3390/polym15051286 (https://doi.org/10.3390/polym15051286) - 03 Mar 2023

Abstract In this study, the quantum chemical method was used to investigate the microscopic characteristics of α-poly viny difluoride (PVDF) molecules under the influence of an electric field, and the impact of mechanical stress and electric field polarization on the insulation performance of PVDF **[...] Read more.**
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Open Access Article (/2073-4360/15/5/1285/pdf?version=1677833201)

Adhesion-Induced Demolding Forces of Hard Coated Microstructures Measured with a Novel Injection Molding Tool (/2073-4360/15/5/1285)

by Maximilian Schoenherr (https://sciprofiles.com/profile/2487691?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Holger Ruehl (https://sciprofiles.com/profile/2539133?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Thomas Guenther (https://sciprofiles.com/profile/579985?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), André Zimmermann (https://sciprofiles.com/profile/424415?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Bernd Gundelsweiler (https://sciprofiles.com/profile/author/ZWp6V2pyVzhLRXQ0T2JBb3p2OCthOTBtdFpEd3c1ZFZZK2ZGa0NJMldsbTVPN29
Polymers **2023**, *15*(5), 1285; https://doi.org/10.3390/polym15051285 (https://doi.org/10.3390/polym15051285) - 03 Mar 2023

Abstract The demolding of plastic parts remains a challenging aspect of injection molding. Despite various experimental studies and known solutions to reduce demolding forces, there is still not a complete understanding of the effects that occur. For this reason, laboratory devices and in-process measurement **[...] Read more.**
(This article belongs to the Special Issue **Recent Advances in Injection Molding of Polymers (/journal/polymers/special_issues/injection_molding_polym)**)

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Flame-Retardant and Smoke-Suppressant Flexible Polyurethane Foams Based on Phosphorus-Containing Polyester Diols and Expandable Graphite (/2073-4360/15/5/1284)

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Shouke Yan (https://sciprofiles.com/profile/2689319?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1284; https://doi.org/10.3390/polym15051284 (https://doi.org/10.3390/polym15051284) - 03 Mar 2023

Abstract A liquid-phosphorus-containing polyester diol, PPE, was prepared via condensation polymerization using commercial reactive flame retardant 9,10-dihydro-10-[2,3-di(hydroxycarbonyl)propyl]-10-phospha-phenanthrene-10-oxide, adipic acid, ethylene glycol, and 1,4-butanediol. PPE and/or expandable graphite (EG) were then incorporated into phosphorus-containing flame-retardant polyester-based flexible polyurethane foams (P-FPUFs). The structure and properties of [...] Read more.
(This article belongs to the Special Issue Flame-Retardant Polymer Composites (/journal/polymers/special_issues/Flame_Retard_Polym_Compos))

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Open Access Article (/2073-4360/15/5/1283/pdf?version=1677823158)

Thermal Lens Measurements of Thermal Expansivity in Thermosensitive Polymer Solutions (/2073-4360/15/5/1283)

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Polymers **2023**, *15*(5), 1283; https://doi.org/10.3390/polym15051283 (https://doi.org/10.3390/polym15051283) - 03 Mar 2023

Abstract The weak absorption of a laser beam generates in a fluid an inhomogeneous refractive index profile acting as a negative lens. This self-effect on beam propagation, known as Thermal Lensing (TL), is extensively exploited in sensitive spectroscopic techniques, and in several all-optical methods [...]
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Characterizing the Impact of Chitosan on the Nucleation and Crystal Growth of Ritonavir from Supersaturated Solutions (/2073-4360/15/5/1282)

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Polymers **2023**, *15*(5), 1282; **https://doi.org/10.3390/polym15051282 (https://doi.org/10.3390/polym15051282)** - 03 Mar 2023

Abstract The addition of polymeric materials is often used to delay nucleation or crystal growth and maintain the high supersaturation of amorphous drugs. Therefore, this study aimed to investigate the impact of chitosan on the supersaturation behavior of drugs with a low recrystallization tendency **[...]**
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Phase Equilibria and Structure Formation in the Polylactic-co-Glycolic Acid/Tetraglycol/Water Ternary System (/2073-4360/15/5/1281)

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Polymers **2023**, *15*(5), 1281; **https://doi.org/10.3390/polym15051281 (https://doi.org/10.3390/polym15051281)** - 03 Mar 2023 Back to TopTop

Abstract This paper concerns a detailed study of the phase separation and structure formation processes that occur in solutions of highly hydrophobic polylactic-co-glycolic acid (PLGA) in highly hydrophilic tetraglycol (TG) upon their contact with aqueous media. In the present work, cloud point methodology, high-speed **[...] Read more.**
(This article belongs to the Special Issue **Structural Rheology of Polymer Melts, Solutions and Compositions on Their Base II (/journal/polymers/special_issues/500087O2W4)**)

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Open Access Article **(/2073-4360/15/5/1280/pdf?version=1677815042)**

Preparation of Superhydrophobic Materials and Establishment of Anticorrosive Coatings on the Tinplate Substrate by Alkylation of Graphene Oxide (/2073-4360/15/5/1280)

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Polymers **2023**, *15*(5), 1280; **https://doi.org/10.3390/polym15051280 (https://doi.org/10.3390/polym15051280)** - 03 Mar 2023

Abstract Corrosion of structural parts not only reduces the service life of the equipment but also causes safety accidents, so building a long-lasting anti-corrosion coating on its surface is the key to solving this problem. Under the action of alkali catalysis, n-octyltriethoxysilane (OTES), dimethyldimethoxysilane **[...] Read more.**
(This article belongs to the Special Issue **Functional Polymer Coating (/journal/polymers/special_issues/P0P9S799SR)**)

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Open Access Review **(/2073-4360/15/5/1279/pdf?version=1677829445)**

Covalent Organic Frameworks: From Structures to Applications (/2073-4360/15/5/1279)

by **Quang Nhat Tran (https://sciprofiles.com/profile/2528854?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1279; **https://doi.org/10.3390/polym15051279 (https://doi.org/10.3390/polym15051279)** - 02 Mar 2023

Abstract Three-dimensional covalent organic frameworks possess hierarchical nanopores, enormous surface areas with high porosity, and open positions. The synthesis of large crystals of three-dimensional covalent organic frameworks is a challenge, since different structures are generated during the synthesis. Presently, their synthesis with new topologies **[...] Read more.**
(This article belongs to the Special Issue **Organic Polymers and Their Applications (/journal/polymers/special_issues/43W5RB4N77)**)

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Open Access Article (/2073-4360/15/5/1278/pdf?version=1677833812)

Study of the Compressive Properties of Heavy Calcium Carbonate-Reinforced Epoxy Composite Spheres (HC-R-EMS) Composite Lightweight Concrete (/2073-4360/15/5/1278)

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Polymers **2023**, *15*(5), 1278; https://doi.org/10.3390/polym15051278 (https://doi.org/10.3390/polym15051278) - 02 Mar 2023

Abstract Lightweight concrete is one of the effective means to solve the problems of structural component weight, energy efficiency, and fire safety in modern civil engineering. Heavy calcium carbonate-reinforced epoxy composite spheres (HC-R-EMS) were prepared by the ball milling method, and HC-R-EMS, cement, and [...] Read more.
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Open Access Editorial (/2073-4360/15/5/1277/pdf?version=1677765540)

Functional Polymeric Systems for Advanced Industrial Applications (/2073-4360/15/5/1277)

by Huacheng Zhang (https://sciprofiles.com/profile/973939?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1277; https://doi.org/10.3390/polym15051277 (https://doi.org/10.3390/polym15051277) - 02 Mar 2023
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Abstract Functional polymeric systems constitute a huge family of novel hierarchical architectures categorized by different polymeric shapes, such as linear, brush-like, star-like, dendrimer-like and network-like ones; various components, such as organic–inorganic hybrid oligomeric/polymeric materials and metal-ligated polymers; different features, such as porous polymers; and [...] Read more.
(This article belongs to the Special Issue Functional Polymeric Systems for Advanced Industrial Applications (/journal/polymers/special_issues/Funct_Polym_Syst_Adv_Ind_Appl))

Open Access Article (/2073-4360/15/5/1276/pdf?version=1677815823)

Investigation on the Photodegradation Stability of Acrylic Acid-Grafted Poly(butylene carbonate-co-terephthalate)/Organically Modified Layered Zinc Phenylphosphonate Composites (/2073-4360/15/5/1276)

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Polymers **2023**, *15*(5), 1276; https://doi.org/10.3390/polym15051276 (https://doi.org/10.3390/polym15051276) - 02 Mar 2023
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Abstract The application efficiency of biodegradable polymers used in a natural environment requires improved resistance to ultraviolet (UV) photodegradation. In this report, 1,6-hexanediamine modified layered zinc phenylphosphonate (m-PPZn), utilized as a UV protection additive for acrylic acid-grafted poly(butylene carbonate-co-terephthalate) (g-PBCT), was successfully fabricated and [...] Read more.
(This article belongs to the Special Issue Degradation and Stability of Polymer Based Systems (/journal/polymers/special_issues/degradation_stability_polymer_systems))

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Electrosprayed Particles Loaded with Kartogenin as a Potential Osteochondral Repair Implant (/2073-4360/15/5/1275)

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Polymers **2023**, *15*(5), 1275; https://doi.org/10.3390/polym15051275 (https://doi.org/10.3390/polym15051275) - 02 Mar 2023

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Abstract The restoration of cartilage damage is a slow and not always successful process. Kartogenin (KGN) has significant potential in this space—it is able to induce the chondrogenic differentiation of stem cells and protect articular chondrocytes. In this work, a series of poly(lactic-co-glycolic acid) [...] Read more.

(This article belongs to the Special Issue **Insights into Biodegradable Polymer-Based Delivery Vehicles for Pharmaceutical Applications: Traditional and Current Approaches (/journal/polymers/special_issues/Insights_Biodegradable_Polymer_Based_Delivery_Vehicles_Pharmaceutical_Applications_Traditional_Current))**

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Open Access Article (/2073-4360/15/5/1274/pdf?version=1678181277)

Reinforcement Behavior of Chemically Unmodified Cellulose Nanofiber in Natural Rubber Nanocomposites (/2073-4360/15/5/1274)

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Polymers **2023**, *15*(5), 1274; https://doi.org/10.3390/polym15051274 (https://doi.org/10.3390/polym15051274) - 02 Mar 2023

Abstract We investigated the reinforcement behavior of small amounts of chemically unmodified cellulose nanofiber (CNF) in eco-friendly natural rubber (NR) nanocomposites. For this purpose, NR nanocomposites filled with 1, 3, and 5 parts per hundred rubber (phr) of cellulose nanofiber (CNF) were prepared by [...] Read more.
(This article belongs to the Special Issue **Advances in Sustainable Polymeric Materials II (/journal/polymers/special_issues/DN455O4838)**)

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Influence of Polyols on the In Vitro Biodegradation and Bioactivity of 58S Bioactive Sol–Gel Coatings on AZ31B Magnesium Alloys (/2073-4360/15/5/1273)

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Polymers **2023**, *15*(5), 1273; https://doi.org/10.3390/polym15051273 (https://doi.org/10.3390/polym15051273) - 02 Mar 2023

Abstract The mechanical qualities of AZ31B magnesium alloys make them a promising material for biodegradable metallic implants. However, rapid degradation limits the application of these alloys. In the present study, 58S bioactive glasses were synthesized using the sol-gel method and several polyols such as [...] Read more.
(This article belongs to the Special Issue Biodegradable Polymeric Implants for Drug Delivery and Cell Therapy Applications (/journal/polymers/special_issues/biodegrad_polym_implant_drug_deliv))

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Quantitative Evaluation of Thermal Ageing State of Cross-Linked Polyethylene Insulation Based on Polarization and Depolarization Current (/2073-4360/15/5/1272)

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Polymers **2023**, *15*(5), 1272; https://doi.org/10.3390/polym15051272 (https://doi.org/10.3390/polym15051272) - 02 Mar 2023

Abstract The widespread use of cross-linked polyethylene (XLPE) as insulation in cables may be attributed to its outstanding mechanical and dielectric properties. In order to quantitatively evaluate the insulation status of XLPE after thermal ageing, an accelerated thermal ageing experimental platform is established. Polarization [...] Read more.
(This article belongs to the Special Issue Electric Properties, Characterization, and Simulation of Polymer Composites (/journal/polymers/special_issues/7OS59W0QL0))

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Synthesis and Investigation of Physicochemical and Biological Properties of Films Containing Encapsulated Propolis in Hyaluronic Matrix (/2073-4360/15/5/1271)

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Polymers **2023**, *15*(5), 1271; https://doi.org/10.3390/polym15051271 (https://doi.org/10.3390/polym15051271) - 02 Mar 2023

Abstract The dynamic development of nanotechnology has enabled the development of innovative and novel techniques for the production and use of nanomaterials. One of them is the use of nanocapsules based on biodegradable biopolymer composites. Closing compounds with antimicrobial activity inside the nanocapsule cause [...] Read more.
(This article belongs to the Special Issue **Biopolymers for Biomedical Applications II (/journal/polymers/special_issues/biopoly_biomed_appl_II)**)

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A Self-Healable and Recyclable Zwitterionic Polyurethane Based on Dynamic Ionic Interactions (/2073-4360/15/5/1270)

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Polymers **2023**, *15*(5), 1270; https://doi.org/10.3390/polym15051270 (https://doi.org/10.3390/polym15051270) - 02 Mar 2023

Abstract Polyurethanes with self-healing and reprocessing capabilities are promising in eco-friendly applications. Here, a self-healable and recyclable zwitterionic polyurethane (ZPU) was developed by introducing ionic bonds between protonated ammonium groups and sulfonic acid moieties. The structure of the synthesized ZPU was characterized by FTIR [...] Read more.
(This article belongs to the Section **Smart and Functional Polymers (/journal/polymers/sections/Smart_Funct)**)

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Chitosan-Bead-Encapsulated Polystyrene Sulfonate for Adsorption of Methylene Blue and Regeneration Studies: Batch and Continuous Approaches (/2073-4360/15/5/1269)

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Polymers **2023**, *15*(5), 1269; https://doi.org/10.3390/polym15051269 (https://doi.org/10.3390/polym15051269) - 02 Mar 2023

Abstract Textile industrialization causes water pollution due to the discharge of industrial effluents into the environment. To reduce the impact of industrial effluent, it must be treated in wastewater treatment plants before discharge into rivers. Among all wastewater treatment approaches, the adsorption process is **[...] Read more.**
(This article belongs to the Special Issue **Novel Wastewater Treatment Applications Using Effective Materials (/journal/polymers/special_issues/88JC2ENE4E)**)

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Open Access Article (/2073-4360/15/5/1268/pdf?version=1677750772)

Tribological Properties of Glass Bead-Filled Polyamide 12 Composite Manufactured by Selective Laser Sintering (/2073-4360/15/5/1268)

by
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Polymers **2023**, *15*(5), 1268; https://doi.org/10.3390/polym15051268 (https://doi.org/10.3390/polym15051268) - 02 Mar 2023

Abstract To enhance the properties of polyamide 12 (PA12/Nylon 12) manufactured by the selective laser sintering (SLS) process, micron-sized glass beads are used as a filler, and the resulting composite is known as glass bead-filled PA12 (PA 3200 GF). Despite PA 3200 GF basically **[...] Read more.**
(This article belongs to the Special Issue **Preparation and Application of Functional Polymer Materials (/journal/polymers/special_issues/polymer_functional_material_preparation_application)**)

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Open Access Article (/2073-4360/15/5/1267/pdf?version=1677823948)

Silver Decorated and Graphene Wrapped Polypyrrole@Ni(OH)$_2$ Quaternary Nanocomposite for High Performance Energy Storage Devices (/2073-4360/15/5/1267)

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Polymers **2023**, *15*(5), 1267; https://doi.org/10.3390/polym15051267 (https://doi.org/10.3390/polym15051267) - 02 Mar 2023

Abstract In this work, silver (Ag) anchored over graphene (GN) wrapped polypyrrole (PPy)@ nickel hydroxide ($Ni(OH)_2$) nanocomposites were synthesized through a combination of oxidative polymerization and hydrothermal processes. The synthesized Ag/GN@PPy–$Ni(OH)_2$ nanocomposites were characterized for their morphological characteristics by field emission [...] Read more.
(This article belongs to the Section Polymer Applications (/journal/polymers/sections/Polymer_Applications))

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Open Access Article (/2073-4360/15/5/1266/pdf?version=1677745713)

Effect of Flame Treatment on Bonding Performance of GF/EP Pultrusion Sheets Used for VARI Process (/2073-4360/15/5/1266)

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Polymers **2023**, *15*(5), 1266; https://doi.org/10.3390/polym15051266 (https://doi.org/10.3390/polym15051266) - 02 Mar 2023

Abstract This paper presents an easy and low-cost flame treatment method to improve the bonding performance of GF/EP (Glass Fiber-Reinforced Epoxy) pultrusion plates, which are using widely for large size wind blades. In order to explore the effect of flame treatment on the bonding [...] Read more.
(This article belongs to the Special Issue New Developments in Fiber-Reinforced Polymer Composites (/journal/polymers/special_issues/Polymers_Fiber_Mechanical_Behavior))

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Open Access Article (/2073-4360/15/5/1265/pdf?version=1677743066)

Use of a Photocleavable Initiator to Characterize Polymer Chains Grafted onto a Metal Plate with the Grafting-from Method (/2073-4360/15/5/1265)

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Polymers **2023**, *15*(5), 1265; https://doi.org/10.3390/polym15051265 (https://doi.org/10.3390/polym15051265) - 02 Mar 2023

Abstract The thorough characterization of polymer chains grafted through a “grafting-from” process onto substrates based on the determination of number (Mn) and weight (Mw) average molar masses, as well as dispersity (Đ), is quite challenging. It requires the cleavage of grafted chains selectively at [...] Read more.
(This article belongs to the Collection Polymeric Coatings (/journal/polymers/topical_collections/Polymeric_Coatings_Collection))

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Open Access Editorial (/2073-4360/15/5/1264/pdf?version=1677740091)

Special Issue “State-of-the-Art Polymer Science and Technology in Greece” (/2073-4360/15/5/1264)

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Polymers **2023**, *15*(5), 1264; https://doi.org/10.3390/polym15051264 (https://doi.org/10.3390/polym15051264) - 02 Mar 2023

Abstract Polymer science and technology is an active and continuously developing field of research and innovation in Greece [...] Full article (/2073-4360/15/5/1264)
(This article belongs to the Special Issue State-of-the-Art Polymer Science and Technology in Greece (/journal/polymers/special_issues/GRC_2020_2021))

Open Access Article (/2073-4360/15/5/1263/pdf?version=1677739705)

Anti-Blast Performance of Polyurea-Coated Concrete Arch Structures (/2073-4360/15/5/1263)

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Polymers **2023**, *15*(5), 1263; https://doi.org/10.3390/polym15051263 (https://doi.org/10.3390/polym15051263) - 02 Mar 2023

Abstract With the increasing number of violent terrorist attacks around the world, it is quite a common to improve the anti-blast performance of structures by reinforcing the exterior of the structure. In order to explore the dynamic performance of polyurea reinforced concrete arch structures, [...] Read more.
(This article belongs to the Section Polymer Applications (/journal/polymers/sections/Polymer_Applications))

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Open Access Article (/2073-4360/15/5/1262/pdf?version=1677741064)

Characterizing Pure Polymers under High Speed Compression for the Micromechanical Prediction of Unidirectional Composites (/2073-4360/15/5/1262)

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Polymers **2023**, *15*(5), 1262; https://doi.org/10.3390/polym15051262 (https://doi.org/10.3390/polym15051262) - 02 Mar 2023

Abstract The nonlinear behaviour of fibre-reinforced polymer composites (FRPC) in transverse loading is mainly induced by the constituent polymer matrix. The thermoset and thermoplastic matrices are typically rate- and temperature-dependent, complicating the dynamic material characterization process. Under dynamic compression, the microstructure of the FRPC [...] Read more.
(This article belongs to the Special Issue Multiscale Modelling of Fiber Reinforced Polymer Composites (/journal/polymers/special_issues/Multiscale_Modeling_Fiber_Reinforced_Polymer_Composites))

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Open Access Article (/2073-4360/15/5/1261/pdf?version=1677734282)

Biodegradable Polylactic Acid-Polyhydroxyalkanoate-Based Nanocomposites with Bio-Hydroxyapatite: Preparation and Characterization (/2073-4360/15/5/1261)

by
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Polymers **2023**, *15*(5), 1261; https://doi.org/10.3390/polym15051261 (https://doi.org/10.3390/polym15051261) - 02 Mar 2023

Abstract Biodegradable polymers play a significant role in medical applications, especially internal devices because they can be broken down and absorbed into the body without producing harmful degradation products. In this study, biodegradable polylactic acid (PLA)-polyhydroxyalkanoate (PHA)-based nanocomposites with various PHA and nano-hydroxyapatite (nHAp) [...] Read more.
(This article belongs to the Special Issue
Multifunctional Polymers Used in Agricultural Application and Environmental Treatment

(/journal/polymers/special_issues/Multifunct_Nanocomposites_Used_Agric_Appl_Environ_Treat_))

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Quaternized Poly(*N*,*N*′-dimethylaminoethyl methacrylate) Star Nanostructures in the Solution and on the Surface (/2073-4360/15/5/1260)

by
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Polymers **2023**, *15*(5), 1260; **https://doi.org/10.3390/polym15051260 (https://doi.org/10.3390/polym15051260)** - 01 Mar 2023

Abstract Antibacterial polymeric materials are promising in the fight against resistant bacteria strains. Amongst them, cationic macromolecules with quaternary ammonium groups are one of intensively studied, as they interact with the bacterial membranes causing cell death. In this work, we propose to use nanostructures **[...] Read more.**
(This article belongs to the Special Issue **Self-Assembled Polymeric Nanostructures for Biomedicine and Industry (/journal/polymers/special_issues/Self_Assembled_Polymers)**)

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Imidazolium Salts for *Candida* spp. Antibiofilm High-Density Polyethylene-Based Biomaterials (/2073-4360/15/5/1259)

by
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Polymers **2023**, *15*(5), 1259; **https://doi.org/10.3390/polym15051259 (https://doi.org/10.3390/polym15051259)** - 01 Mar 2023

Abstract The species of *Candida* present good capability to form fungal biofilms on polymeric surfaces and are related to several human diseases since many of the employed medical devices are designed using polymers, especially high-density polyethylene (HDPE). Herein, HDPE films containing 0; 0.125; 0.250 **[...] Read more.**
(This article belongs to the Special Issue **Bioactive Polymer Materials with Antibacterial Properties (/journal/polymers/special_issues/Bioact_Mater_Antibact_Prop)**)

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Open Access Article **(/2073-4360/15/5/1258/pdf?version=1677741376)**

Green Phenolic Resins from Oil Palm Empty Fruit Bunch (EFB) Phenolated Lignin and Bio-Oil as Phenol Substitutes for Bonding Plywood (/2073-4360/15/5/1258)

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Mohd Termizi Yusof (https://sciprofiles.com/profile/1174781?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1258; https://doi.org/10.3390/polym15051258 (https://doi.org/10.3390/polym15051258) - 01 Mar 2023

Abstract Lignin is a natural biopolymer with a complex three-dimensional network and it is rich in phenol, making it a good candidate for the production of bio-based polyphenol material. This study attempts to characterize the properties of green phenol-formaldehyde (PF) resins produced through phenol [...]
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(This article belongs to the Special Issue **Eco-Friendly Wood Composites: Design, Characterization and Applications II (/journal/polymers/special_issues/3PE4L48HC7)**)

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Open Access Article (/2073-4360/15/5/1257/pdf?version=1677674878)

New *Inonotus* Polysaccharides: Characterization and Anticomplementary Activity of *Inonotus rheades* Mycelium Polymers (/2073-4360/15/5/1257)

by
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Polymers **2023**, *15*(5), 1257; https://doi.org/10.3390/polym15051257 (https://doi.org/10.3390/polym15051257) - 01 Mar 2023

Abstract *Inonotus* is a small genus of xylotrophic basidiomycetes and a source of bioactive fungochemicals among which a special place is occupied by polymeric compounds. In this study, polysaccharides that are widespread in Europe, Asia, and North America and a poorly understood fungal species, [...]
Read more.
(This article belongs to the Special Issue **Applications of Polysaccharide-Based Materials (/journal/polymers/special_issues/HARH259V9I)**)

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Open Access Article (/2073-4360/15/5/1256/pdf?version=1677661924)

Reducing the Permittivity of Polyimides for Better Use in Communication Devices (/2073-4360/15/5/1256)

by Yuwei Chen (https://sciprofiles.com/profile/1821313?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1256; https://doi.org/10.3390/polym15051256 (https://doi.org/10.3390/polym15051256) - 01 Mar 2023

Abstract Recent studies have shown that introducing fluorinated groups into polyimide (PI) molecules can effectively reduce the dielectric constant (Dk) and dielectric loss (Df) of PIs. In this paper, 2,2′-bis[4-(4-aminophenoxy) phenyl]-1,1′,1′,1′,3,3′,3′-hexafluoropropane (HFBAPP), 2,2′-

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bis(trifluoromethyl)-4,4′-diaminobenzene (TFMB), diaminobenzene ether (ODA), 1,2,4,5-Benzenetetracarboxylic anhydride (PMDA), 3,3′,4,4′-diphenyltetracarboxylic anhydride (s-BPDA) and **[...] Read more.**
(This article belongs to the Special Issue **Current Research on Dielectric Properties of Polymer Composites (/journal/polymers/special_issues/M1TKDXZG96)**)

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Open Access Article **(/2073-4360/15/5/1255/pdf?version=1677658442)**

Effects of Automotive Test Parameters on Dry Friction Fiber-Reinforced Clutch Facing Surface Microgeometry and Wear—Part 3 Tribological Parameter Correlations and Simulation of Thermo-Mechanical Tribological Contact Behavior (/2073-4360/15/5/1255)

by
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Polymers **2023**, *15*(5), 1255; **https://doi.org/10.3390/polym15051255 (https://doi.org/10.3390/polym15051255)** - 01 Mar 2023

Abstract Correlations among previously determined tribological properties, such as the coefficient of friction values, wear and surface roughness differences of hybrid composite dry friction clutch facings are revealed after pin-on-disk test apparatus examinations under three *pv* loads, where samples are cut from a reference, **[...] Read more.**
(This article belongs to the Special Issue **Advances in the Mechanical Behavior of Polymeric Materials (/journal/polymers/special_issues/Advances_Mechanical_Behavior_Polymeric_Materials)**)

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Open Access Review **(/2073-4360/15/5/1254/pdf?version=1677657601)**

Lignin-Based Admixtures: A Scientometric Analysis and Qualitative Discussion Applied to Cement-Based Composites (/2073-4360/15/5/1254)

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Polymers **2023**, *15*(5), 1254; **https://doi.org/10.3390/polym15051254 (https://doi.org/10.3390/polym15051254)** - 01 Mar 2023
Back to TopTop

Abstract The development of lignin-based admixtures (LBAs) for cement-based composites is an alternative to valorizing residual lignins generated in biorefineries and pulp and paper mills. Consequently, LBAs have become an emerging research domain in the past decade. This study examined the bibliographic data on [...] Read more.
(This article belongs to the Special Issue **Advances in Lignin-Based Composites and Polymers (/journal/polymers/special_issues/66EE12Y1X2)**)

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Open Access Review (/2073-4360/15/5/1253/pdf?version=1678153786)

Recent Advances in Centrifugal Spinning and Their Applications in Tissue Engineering (/2073-4360/15/5/1253)

by
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Polymers **2023**, *15*(5), 1253; https://doi.org/10.3390/polym15051253 (https://doi.org/10.3390/polym15051253) - 01 Mar 2023

Abstract Over the last decade, researchers have investigated the potential of nano and microfiber scaffolds to promote wound healing, tissue regeneration, and skin protection. The centrifugal spinning technique is favored over others due to its relatively straightforward mechanism for producing large quantities of fiber. [...] Read more.
(This article belongs to the Special Issue **Nanofibers for Tissue Engineering and Biomedicine (/journal/polymers/special_issues/nanofibers_tissue_engineering)**)

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Experimental Analysis of Fiber Reinforcement Rings’ Effect on Tensile and Flexural Properties of Onyx™–Kevlar® Composites Manufactured by Continuous Fiber Reinforcement (/2073-4360/15/5/1252)

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Polymers **2023**, *15*(5), 1252; https://doi.org/10.3390/polym15051252 (https://doi.org/10.3390/polym15051252) - 01 Mar 2023

Abstract Additive manufacturing of composite materials is progressing in the world of 3D printing technologies; composite materials allow the combination of the physical and mechanical properties of two or more constituents to create a new material that meets the required properties of several applications. [...] Read more.
(This article belongs to the Special Issue **Additive Manufacturing of Fiber-Reinforced Polymer Composites (/journal/polymers/special_issues/Addit_Manufact_of_Fiber_Reinforced_Poly_Composites)**)

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Comparative Study of Green and Traditional Routes for Cellulose Extraction from a Sugarcane By-Product (/2073-4360/15/5/1251)

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Polymers **2023**, *15*(5), 1251; https://doi.org/10.3390/polym15051251 (https://doi.org/10.3390/polym15051251) - 01 Mar 2023

Abstract Sugarcane bagasse (SCB) is the main residue of the sugarcane industry and a promising renewable and sustainable lignocellulosic material. The cellulose component of SCB, present at 40–50%, can be used to produce value-added products for various applications. Herein, we present a comprehensive and [...] Read more.
(This article belongs to the Special Issue **Cellulose and Renewable Materials (/journal/polymers/special_issues/cellulose_renewable_materials)**)

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On the Addition of Multifunctional Methacrylate Monomers to an Acrylic-Based Infusible Resin for the Weldability of Acrylic-Based Glass Fibre Composites (/2073-4360/15/5/1250)

by Henri Perrin (https://sciprofiles.com/profile/1495837?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1250; https://doi.org/10.3390/polym15051250 (https://doi.org/10.3390/polym15051250) - 28 Feb 2023

Abstract The melt strength of Elium® acrylic resin is an important factor to ensure limited fluid flow during welding. To provide Elium® with a suitable melt strength via a slight crosslink, this study examines the effect of two dimethacrylates, namely butanediol-di-methacrylate (BDDMA) **[...] Read more.**
(This article belongs to the Special Issue **Functional Polymer Composites: Synthesis, Characterization and Application (/journal/polymers/special_issues/Functional_Polymer_Composites_Synthesis_Characterization_Application)**)

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Open Access Article (/2073-4360/15/5/1249/pdf?version=1677751636)

Copolymerization of Parylene C and Parylene F to Enhance Adhesion and Thermal Stability without Coating Performance Degradation (/2073-4360/15/5/1249)

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Polymers **2023**, *15*(5), 1249; https://doi.org/10.3390/polym15051249 (https://doi.org/10.3390/polym15051249) - 28 Feb 2023

Abstract Parylene C has been widely used in the fields of microelectromechanical systems (MEMS) and electronic device encapsulation because of its unique properties, such as biocompatibility and conformal coverage. However, its poor adhesion and low thermal stability limit its use in a wider range **[...] Read more.**
(This article belongs to the Special Issue **Feature Papers in Polymer Membranes and Films II (/journal/polymers/special_issues/9406ER4684)**)

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Open Access Review (/2073-4360/15/5/1248/pdf?version=1677743687)

Effects of the Curing Regime, Acid Exposure, Alkaline Activator Dosage, and Precursor Content on the Strength Development of Mortar with Alkali-Activated Slag and Fly Ash Binder: A Critical Review (/2073-4360/15/5/1248)

by Osama A. Mohamed (https://sciprofiles.com/profile/526576?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1248; https://doi.org/10.3390/polym15051248 (https://doi.org/10.3390/polym15051248) - 28 Feb 2023

Abstract Reductions of green gas emissions and the reuse/recycling of industrial byproducts are important for the mitigation of the environmental impact of the construction industry. The replacement of ordinary Portland cement (OPC) is a concrete binder with industrial byproducts that possess sufficient cementitious and **[...] Read more.**
(This article belongs to the Special Issue **Application of Polymeric Materials in the Building Industry II (/journal/polymers/special_issues/build_ind_ii)**)

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Open Access Article (/2073-4360/15/5/1247/pdf?version=1677720573)

Aging of Industrial Polypropylene Surfaces in Detergent Solution and Its Consequences for Biofilm Formation (/2073-4360/15/5/1247)

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Polymers **2023**, *15*(5), 1247; https://doi.org/10.3390/polym15051247 (https://doi.org/10.3390/polym15051247) - 28 Feb 2023

Abstract The performance of plastic components in water-bearing parts of industrial and household appliances, often in the presence of harsh environments and elevated temperatures, critically relies on the mechanical and thermal polymer stability. In this light, the precise knowledge of aging properties of polymers [...] Read more.

(This article belongs to the Special Issue Aging Behavior and Durability of Polymer Materials (/journal/polymers/special_issues/Aging_Behav_Durab_Polym_Mater))

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Open Access Article (/2073-4360/15/5/1246/pdf?version=1677726059)

Effects of pH and Crosslinking Agent in the Evaluation of Hydrogels as Potential Nitrate-Controlled Release Systems (/2073-4360/15/5/1246)

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Polymers **2023**, *15*(5), 1246; https://doi.org/10.3390/polym15051246 (https://doi.org/10.3390/polym15051246) - 28 Feb 2023

Abstract Water scarcity and the loss of fertilizer from agricultural soils through runoff, which also leads to contamination of other areas, are increasingly common problems in agriculture. To mitigate nitrate water pollution, the technology of controlled release formulations (CRFs) provides a promising alternative for [...] Read more.

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Open Access Article **(/2073-4360/15/5/1245/pdf?version=1677842103)**

PET/Graphene Nanocomposite Fibers Obtained by Dry-Jet Wet-Spinning for Conductive Textiles (/2073-4360/15/5/1245)

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Polymers **2023**, *15*(5), 1245; **https://doi.org/10.3390/polym15051245 (https://doi.org/10.3390/polym15051245)** - 28 Feb 2023

Abstract The combination of polyethylene terephthalate (PET), one of the most used polymers in the textile industry, with graphene, one of the most outstanding conductive materials in recent years, represents a promising strategy for the preparation of conductive textiles. This study focuses on the **[...] Read more.**
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Open Access Article **(/2073-4360/15/5/1244/pdf?version=1677741032)**

Investigation of the Influence of Fiber Content, Processing Conditions and Surface Roughness on the Polymer Filling Behavior in Thermoset Injection Molding (/2073-4360/15/5/1244)

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Polymers **2023**, *15*(5), 1244; **https://doi.org/10.3390/polym15051244 (https://doi.org/10.3390/polym15051244)** - 28 Feb 2023

Abstract A completely opposite injection molding filling behavior of thermosets and thermoplastics by an effective and useful method developed by the authors was found. Specifically, for the thermoset injection molding, there is a strong slip between the thermoset melt and wall surface, which is **[...] Read more.**
(This article belongs to the Section **Polymer Processing and Engineering (/journal/polymers/sections/Process_Eng)**)

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Ion-Induced Polysaccharide Gelation: Peculiarities of Alginate Egg-Box Association with Different Divalent Cations (/2073-4360/15/5/1243)

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Polymers **2023**, *15*(5), 1243; https://doi.org/10.3390/polym15051243 (https://doi.org/10.3390/polym15051243) - 28 Feb 2023

Abstract Structural aspects of polysaccharide hydrogels based on sodium alginate and divalent cations Ba^{2+}, Ca^{2+}, Sr^{2+}, Cu^{2+}, Zn^{2+}, Ni^{2+} and Mn^{2+} was studied using data on hydrogel elemental composition and combinatorial analysis [...] Read more.
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Dynamic Wetting Properties of Silica-Poly (Acrylic Acid) Superhydrophilic Coatings (/2073-4360/15/5/1242)

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Polymers **2023**, *15*(5), 1242; https://doi.org/10.3390/polym15051242 (https://doi.org/10.3390/polym15051242) - 28 Feb 2023

Abstract Superhydrophilic coatings based on a hydrophilic silica nanoparticle suspension and Poly (acrylic acid) (PAA) were prepared by dip coating. Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) were used to examine the morphology of the coating. The effect of surface morphology on [...] Read more.
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Investigation on the Effect of Calcium on the Properties of Geopolymer Prepared from Uncalcined Coal Gangue (/2073-4360/15/5/1241)

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Polymers **2023**, *15*(5), 1241; https://doi.org/10.3390/polym15051241 (https://doi.org/10.3390/polym15051241) - 28 Feb 2023

Abstract In this paper, the influence of calcium on coal gangue and fly ash geopolymer is explored, and the problem of low utilization of unburned coal gangue is analyzed and solved. The experiment took uncalcined coal gangue and fly ash as raw materials, and [...] Read more.
(This article belongs to the Special Issue **Advanced Polymer Composite Materials: Processing, Modeling, Properties and Applications II (/journal/polymers/special_issues/D8B397QW9T)**)

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Centrifugal Force-Spinning to Obtain Multifunctional Fibers of PLA Reinforced with Functionalized Silver Nanoparticles (/2073-4360/15/5/1240)

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Polymers **2023**, *15*(5), 1240; https://doi.org/10.3390/polym15051240 (https://doi.org/10.3390/polym15051240) - 28 Feb 2023

Abstract The design and development of multifunctional fibers awakened great interest in biomaterials and food packaging materials. One way to achieve these materials is by incorporating functionalized nanoparticles into matrices obtained by spinning techniques. Here, a procedure for obtaining functionalized silver nanoparticles through a **[...] Read more.**
(This article belongs to the Special Issue **Organic-Inorganic Hybrid Materials III (/journal/polymers/special_issues/BRV433GFOM)**)

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An Imidazolium-Based Ionic Liquid as a Model to Study Plasticization Effects on Cationic Polymethacrylate Films (/2073-4360/15/5/1239)

by
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Polymers **2023**, *15*(5), 1239; https://doi.org/10.3390/polym15051239 (https://doi.org/10.3390/polym15051239) - 28 Feb 2023

Abstract Ionic liquids (ILs) have been touted as effective and environmentally friendly agents, which has driven their application in the biomedical field. The study compares the effectiveness of an IL agent, 1-hexyl-3-methyl imidazolium chloride ([HMIM]Cl), to current industry standards for plasticizing a methacrylate polymer. **[...] Read more.**
(This article belongs to the Special Issue **Feature Papers in Polymer Membranes and Films II (/journal/polymers/special_issues/9406ER4684)**)

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Open Access Article (/2073-4360/15/5/1238/pdf?version=1678092282)

Transfer of AgNPs' Anti-Biofilm Activity into the Nontoxic Polymer Matrix (/2073-4360/15/5/1238)

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Polymers **2023**, *15*(5), 1238; https://doi.org/10.3390/polym15051238 (https://doi.org/10.3390/polym15051238) - 28 Feb 2023

Abstract A biological method was successfully applied to synthesize spherical silver nanoparticles (AgNPs) while using the extract of lavender (Ex-L) (lat. *Lavandula angustifolia*) as the reducing and stabilizing agent. The produced nanoparticles were spherical with an average size of 20 nm. The AgNPs' **[...]**
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Open Access Article **(/2073-4360/15/5/1237/pdf?version=1678266736)**

The Use of Kenaf Fibre as a Natural Anti-Degradant in Recycled High-Density Polyethylene and Natural Rubber-Based Thermoplastic Elastomers (/2073-4360/15/5/1237)

by **Nabil Hayeemasae (https://sciprofiles.com/profile/274120?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1237; **https://doi.org/10.3390/polym15051237 (https://doi.org/10.3390/polym15051237)** - 28 Feb 2023

Abstract As most plastic materials disintegrate without being properly reused after they are discarded, this present study developed a novel thermoplastic elastomer (TPE) using recycled high-density polyethylene (rHDPE) and natural rubber (NR) with kenaf fibre as a sustainable filler. Apart from being used as **[...] Read more.**
(This article belongs to the Special Issue **Advances in the Mechanical Behavior of Polymeric Materials (/journal/polymers/special_issues/Advances_Mechanical_Behavior_Polymeric_Materials)**)

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Open Access Article **(/2073-4360/15/5/1236/pdf?version=1678151443)**

Antimicrobial and Antiviral Properties of Triclosan-Containing Polymer Composite: Aging Effects of pH, UV, and Sunlight Exposure (/2073-4360/15/5/1236)

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Polymers **2023**, *15*(5), 1236; **https://doi.org/10.3390/polym15051236 (https://doi.org/10.3390/polym15051236)** - 28 Feb 2023

Abstract The present study deals with the synthesis and characterization of a polymer composite based on an unsaturated ester loaded with 5 wt.% triclosan, produced by co-mixing on an automated hardware system. The polymer composite's non-porous structure and chemical composition make it an ideal **[...] Read more.**
(This article belongs to the Special Issue **Smart and Functional Polymer Composites (/journal/polymers/special_issues/smart_function_polymer_composite)**)

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Open Access Article **(/2073-4360/15/5/1235/pdf?version=1677832980)**

Modelling of Nonthermal Dielectric Barrier Discharge Plasma at Atmospheric Pressure and Role of Produced Reactive Species in Surface Polymer Microbial Purification (/2073-4360/15/5/1235)

by **Samira Elaissi (https://sciprofiles.com/profile/1844397?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)** and **Norah A. M. Alsaif (https://sciprofiles.com/profile/author/ejdHMnFrVitzcWFlLyt3NlE4dGtBSEQxQzVRd3d6RG1BakdmV3pUQjZ5TT0=?utm_sou**
Polymers **2023**, *15*(5), 1235; **https://doi.org/10.3390/polym15051235 (https://doi.org/10.3390/polym15051235)** - 28 Feb 2023

Abstract A nonthermal atmospheric plasma reactor was used to sterilize polymer surfaces and satisfy safety constraints in a biological medium. A 1D fluid model was developed using COMSOL Multiphysics software® 5.4 with a helium–oxygen mixture at low temperature for the decontamination of bacteria **[...] Read more.**
(This article belongs to the Special Issue **Plasma Processes for Polymers II (/journal/polymers/special_issues/plasma_process_polym)**)

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Open Access Review **(/2073-4360/15/5/1234/pdf?version=1677737049)**

Recent Advances in the Application of ATRP in the Synthesis of Drug Delivery Systems (/2073-4360/15/5/1234)

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Polymers **2023**, *15*(5), 1234; **https://doi.org/10.3390/polym15051234 (https://doi.org/10.3390/polym15051234)** - 28 Feb 2023

Abstract Advances in atom transfer radical polymerization (ATRP) have enabled the precise design and preparation of nanostructured polymeric materials for a variety of biomedical applications. This paper briefly summarizes recent developments in the synthesis of bio-therapeutics for drug delivery based on linear and branched **[...] Read more.**
(This article belongs to the Special Issue **Polymeric Carriers for Delivery Systems in Biomedical Applications – in Memory of Professor Andrzej Dworak (/journal/polymers/special_issues/polym_carr_deliv_biomed_appli_mem_prof_Dworak)**)

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Open Access Article **(/2073-4360/15/5/1233/pdf?version=1677655453)**

Preparation and Characterization of a Novel Cassava Starch-Based Phosphorus Releasing Super-Absorbent Polymer, and Optimization of the Performance of Water Absorption and Phosphorus Release (/2073-4360/15/5/1233)

by **Wenbo Bai (https://sciprofiles.com/profile/2699968?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1233; **https://doi.org/10.3390/polym15051233 (https://doi.org/10.3390/polym15051233)** - 28 Feb 2023

Abstract To prepare a novel cassava starch-based phosphorus releasing super-absorbent polymer (CST-PRP-SAP), the single factor and orthogonal experiment were applied to analyze the effects of different reaction conditions on the absorption and phosphorus release capacities of CST-PRP-SAP samples. The structural and morphological characteristics of **[...] Read more.**
(This article belongs to the Special Issue **Latest Research and Applications of Cellulose and Nanocellulose (/journal/polymers/special_issues/IOL8EZR3H3)**)

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Open Access Article **(/2073-4360/15/5/1232/pdf?version=1677923680)**

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[Functionality Versus Sustainability for PLA in MEX 3D Printing: The Impact of Generic Process Control Factors on Flexural Response and Energy Efficiency (/2073-4360/15/5/1232)]

by Markos Petousis (https://sciprofiles.com/profile/675158?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Nectarios Vidakis (https://sciprofiles.com/profile/1045327?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Nikolaos Mountakis (https://sciprofiles.com/profile/1384631?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Emmanuel Karapidakis (https://sciprofiles.com/profile/765367?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Amalia Moutsopoulou (https://sciprofiles.com/profile/2333282?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1232; https://doi.org/10.3390/polym15051232 (https://doi.org/10.3390/polym15051232) - 28 Feb 2023

Abstract Process sustainability vs. mechanical strength is a strong market-driven claim in Material Extrusion (MEX) Additive Manufacturing (AM). Especially for the most popular polymer, Polylactic Acid (PLA), the concurrent achievement of these opposing goals may become a puzzle, especially since MEX 3D-printing offers a [...] Read more.
(This article belongs to the Special Issue New Advances in Polymer Materials for Product Design Processes and Additive Manufacturing (/journal/polymers/special_issues/New_Adv_Polym_Mater_Prod_Des_Proceses_Addit_Manufcturing))

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Open Access Article (/2073-4360/15/5/1231/pdf?version=1677665035)

[3,4-Enhanced Polymerization of Isoprene Catalyzed by Side-Arm Tridentate Iminopyridine Iron Complex with High Activity: Optimization via Response Surface Methodology (/2073-4360/15/5/1231)]

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Polymers **2023**, *15*(5), 1231; https://doi.org/10.3390/polym15051231 (https://doi.org/10.3390/polym15051231) - 28 Feb 2023

Abstract 3,4-Enhanced polymerization of isoprene catalyzed by late transition metal with high activity remains one of the great challenges in synthetic rubber chemistry. Herein, a library of [N, N, X] tridentate iminopyridine iron chloride pre-catalysts (**Fe 1–4**) with the side arm were [...] Read more.
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Open Access Article (/2073-4360/15/5/1230/pdf?version=1678407915)

[Experimental and Numerical Investigation of Compressive Membrane Action in GFRP-Reinforced Concrete Slabs (/2073-4360/15/5/1230)]

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and
Desmond Robinson (https://sciprofiles.com/profile/author/SGYvc0lTbEM2U3FabXd4S0d3LzBNMkowL21uazMxWTRVbHQ4b1haYmNpND0=?ut

Polymers **2023**, *15*(5), 1230; https://doi.org/10.3390/polym15051230 (https://doi.org/10.3390/polym15051230) - 28 Feb 2023

Abstract Experimental and numerical analyses of eight in-plane restrained slabs (1425 mm (length) × 475 mm (width) × 150 mm (thickness)) reinforced with glass fiber-reinforced polymer (GFRP) bars are reported in this paper. The test slabs were installed into a rig, that provided 855 **[...] Read more.**

(This article belongs to the Special Issue **Fiber Reinforced Polymers Applications as Reinforcement of Concrete Structures—Design Aspects, Tests and Analysis (/journal/polymers/special_issues/Fiber_Reinforced_Polymer_Concrete_Analysis)**)

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The Effect of Various Environmental Conditions on the Impact Damage Behaviour of Natural-Fibre-Reinforced Composites (NFRCs)—A Critical Review (/2073-4360/15/5/1229)

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Polymers **2023**, *15*(5), 1229; https://doi.org/10.3390/polym15051229 (https://doi.org/10.3390/polym15051229) - 28 Feb 2023

Abstract Studies into environmental conditions and their effects on the properties of renewable materials are gaining significant attention in the research field, particularly for natural fibres and their resultant composites. However, natural fibres are prone to water absorption because of the hydrophilic nature of **[...] Read more.**

(This article belongs to the Special Issue **Wood Polymer Composites: Modification, Processing and Characterization (/journal/polymers/special_issues/wood_polym_compo_mod_proce_char)**)

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Effect of Polymer Matrix on Inelastic Strain Development in PI- and PEI-Based Composites Reinforced with Short Carbon Fibers under Low-Cyclic Fatigue (/2073-4360/15/5/1228)

by Sergey V. Panin (https://sciprofiles.com/profile/699877?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Alexey A. Bogdanov (https://sciprofiles.com/profile/2028656?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Alexander V. Eremin (https://sciprofiles.com/profile/2226325?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Dmitry G. Buslovich (https://sciprofiles.com/profile/923473?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Ivan S. Shilko (https://sciprofiles.com/profile/author/OVBjdVN3NC9TM09Nb2VsZ1YyVVVVUktlUTZ2dGNCUVV3VEYwQ21pQm1QWT0=?utm_sc
Polymers **2023**, *15*(5), 1228; https://doi.org/10.3390/polym15051228 (https://doi.org/10.3390/polym15051228) - 28 Feb 2023

Abstract Since the inelastic strain development plays an important role in the low-cycle fatigue (LCF) of High-Performance Polymers (HPPs), the goal of the research was to study the effect of an amorphous polymer matrix type on the resistance to cyclic loading for both polyimide [...] Read more.
(This article belongs to the Special Issue **Fiber Reinforced Polymer Materials II (/journal/polymers/special_issues/33357TR1BW)**)

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Experimental Research of Abnormal Wear for Water-Lubricated Polymer Bearings under Low Speed, Heavy Pressure, and High Water Temperature (/2073-4360/15/5/1227)

by Ying Liu (https://sciprofiles.com/profile/232843?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Gengyuan Gao (https://sciprofiles.com/profile/3004878?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Dan Jiang (https://sciprofiles.com/profile/author/MG9uT09ZeDZaeFlWZXBIZVU2SzBkZUkwZ05GdTlnQ2ZkUFBmV3pNcEdLOD0=?utm_source=
Polymers **2023**, *15*(5), 1227; https://doi.org/10.3390/polym15051227 (https://doi.org/10.3390/polym15051227) - 28 Feb 2023

Abstract Polymer bearings used in a real ship had a hydrolysis failure under 50 rpm at 0.5 MPa with 40 °C water temperature. The test conditions were determined based on the operating conditions of the real ship. The test equipment was rebuilt to accommodate [...] Read more.
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Dual-Wavelength Lasing with Orthogonal Circular Polarizations Generated in a Single Layer of a Polymer–Cholesteric Liquid Crystal Superstructure (/2073-4360/15/5/1226)

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Polymers **2023**, *15*(5), 1226; https://doi.org/10.3390/polym15051226 (https://doi.org/10.3390/polym15051226) - 28 Feb 2023

Abstract We investigate the laser emission from a polymer–cholesteric liquid crystal superstructure with coexisting opposite chiralities fabricated by refilling a right-handed polymeric scaffold with a left-handed cholesteric liquid crystalline material. The superstructure exhibits two photonic band gaps corresponding to the right- and left-circularly polarized [...] Read more.
(This article belongs to the Special Issue **Mechanical and Structure–Property Relationships of Polymer Composites (/journal/polymers/special_issues/Mechanical_Structure_Property_Polymer_Composites)**)

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Open Access Article (/2073-4360/15/5/1225/pdf?version=1678173719)

Mechanical and Dynamic Mechanical Behavior of the Lignocellulosic Pine Needle Fiber-Reinforced SEBS Composites (/2073-4360/15/5/1225)

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Bijender Kumar (https://sciprofiles.com/profile/1358000?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and
Jaehwan Kim (https://sciprofiles.com/profile/15636?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1225; https://doi.org/10.3390/polym15051225 (https://doi.org/10.3390/polym15051225) - 28 Feb 2023

Abstract Aiming to generate wealth from waste and due to their significant fire threats to forests and their rich cellulose content, lignocellulosic pine needle fibers (PNFs) are utilized in this study as a reinforcement of the thermoplastic elastomer styrene ethylene butylene styrene (SEBS) matrix [...] Read more.
(This article belongs to the Special Issue **Advances in Cellulose-Based Polymers and Their Composites (/journal/polymers/special_issues/G0IA8EG796)**)

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Open Access Article (/2073-4360/15/5/1224/pdf?version=1677579317)

Effects of Vinyl Functionalized Silica Particles on Thermal and Mechanical Properties of Liquid Silicone Rubber Nanocomposites (/2073-4360/15/5/1224)

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Polymers **2023**, *15*(5), 1224; https://doi.org/10.3390/polym15051224 (https://doi.org/10.3390/polym15051224) - 28 Feb 2023

Abstract It is very important to develop a new method of preparing high-performance liquid silicone rubber-reinforcing filler. Herein, the hydrophilic surface of silica (SiO_2) particles was modified by a vinyl silazane coupling agent to prepare a new type of hydrophobic reinforcing filler. [...] Read more.
(This article belongs to the Special Issue **Carbon-Based Materials and Their Composites: Synthesis and Application (/journal/polymers/special_issues/carbon_fibers_composites_synthesis_application)**)

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Open Access Article (/2073-4360/15/5/1223/pdf?version=1677575561)

Optical, Thermal, and Electrical Characterization of Polyvinyl Pyrrolidone/Carboxymethyl Cellulose Blend Scattered by Tungsten-Trioxide Nanoparticles (/2073-4360/15/5/1223)

by
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Polymers **2023**, *15*(5), 1223; https://doi.org/10.3390/polym15051223 (https://doi.org/10.3390/polym15051223) - 28 Feb 2023

Abstract The polymeric material polyvinyl pyrrolidine/carboxymethyl cellulose (PVP/CMC) was mixed with different quantities of tungsten-trioxide nanoparticles (WO_3 NPs). The samples were created using the casting method and Pulsed Laser Ablation (PLA). The manufactured samples were analyzed by utilizing various methods. The halo peak [...] Read more.
(This article belongs to the Special Issue **Functional Polymer Composites Applied in Batteries (/journal/polymers/special_issues/7JD78VT044)**)

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Novel Mixed Matrix Membranes Based on Poly(vinylidene fluoride): Development, Characterization, Modeling (/2073-4360/15/5/1222)

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Polymers **2023**, *15*(5), 1222; https://doi.org/10.3390/polym15051222 (https://doi.org/10.3390/polym15051222) - 28 Feb 2023

Abstract Membrane technology is an actively developing area of modern societies; with the help of high-performance membranes, it is possible to separate various mixtures for many industrial tasks. The objective of this study was to develop novel effective membranes based on poly(vinylidene fluoride) (PVDF) **[...] Read more.**

(This article belongs to the Special Issue **Polymers for Membrane Separation: Properties and Applications (/journal/polymers/special_issues/Polym_Membr_Sep_Prop_Appl)**)

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Open Access Article (/2073-4360/15/5/1221/pdf?version=1678177110)

Green Synthesis of Fe–Cu Bimetallic Supported on Alginate-Limestone Nanocomposite for the Removal of Drugs from Contaminated Water (/2073-4360/15/5/1221)

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Polymers **2023**, *15*(5), 1221; https://doi.org/10.3390/polym15051221 (https://doi.org/10.3390/polym15051221) - 28 Feb 2023

Abstract In this study Fe–Cu supported on Alginate-limestone (Fe–Cu/Alg–LS) was prepared. The increase in surface area was the main motivation for the synthesis of ternary composites. Scanning electronic microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), and transmission electron microscopy (TEM) were used to examine the [...] Read more.
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The *Dosidicus gigas* Collagen for Scaffold Preparation and Cell Cultivation: Mechanical and Physicochemical Properties, Morphology, Composition and Cell Viability (/2073-4360/15/5/1220)

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Polymers **2023**, *15*(5), 1220; https://doi.org/10.3390/polym15051220 (https://doi.org/10.3390/polym15051220) - 28 Feb 2023

Abstract Directed formation of the structure of the culture of living cells is the most important task of tissue engineering. New materials for 3D scaffolds of living tissue are critical for the mass adoption of regenerative medicine protocols. In this manuscript, we demonstrate the [...] Read more.
(This article belongs to the Special Issue Multi-Functional Collagen-Based Biomaterials for Biomedical Applications (/journal/polymers/special_issues/multi_functional_collagen_based_biomaterials_for_biomedical_applications))

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Open Access Review (/2073-4360/15/5/1219/pdf?version=1677573422)

Processing, Properties, Modifications, and Environmental Impact of Nanocellulose/Biopolymer Composites: A Review (/2073-4360/15/5/1219)

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Polymers **2023**, *15*(5), 1219; https://doi.org/10.3390/polym15051219 (https://doi.org/10.3390/polym15051219) - 28 Feb 2023

Abstract The increasing concerns about plastic pollution and climate change have encouraged research into bioderived and biodegradable materials. Much attention has been focused on nanocellulose due to its abundance, biodegradability, and excellent mechanical properties. Nanocellulose-based biocomposites are a viable option to fabricate functional and [...] Read more.
(This article belongs to the Special Issue Properties, Structure and Environmental Impact of Organic and Inorganic Polymer Composites (/journal/polymers/special_issues/1I3504CTY8))

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Open Access Article (/2073-4360/15/5/1218/pdf?version=1678171305)

Colorimetric Determination of Glucose in Sweat Using an Alginate-Based Biosystem (/2073-4360/15/5/1218)

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Polymers **2023**, *15*(5), 1218; https://doi.org/10.3390/polym15051218 (https://doi.org/10.3390/polym15051218) - 28 Feb 2023

Abstract Glucose is an analyte of great importance, both in the clinical and sports fields. Since blood is the gold standard biofluid used for the analytical determination of glucose, there is high interest in finding alternative non-invasive biofluids, such as sweat, for its determination. [...] Read more.
(This article belongs to the Special Issue Medical Application of Polymer-Based Composites III (/journal/polymers/special_issues/Med_poly_compos_III))

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Electrical Breakdown Mechanism of ENB-EPDM Cable Insulation Based on Density Functional Theory (/2073-4360/15/5/1217)

by Zhiyi Pang (https://sciprofiles.com/profile/2802597?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Yi Li (https://sciprofiles.com/profile/848169?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Yiyi Zhang (https://sciprofiles.com/profile/357341?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1217; https://doi.org/10.3390/polym15051217 (https://doi.org/10.3390/polym15051217) - 28 Feb 2023

Abstract The ethylene propylene diene monomer (EPDM) is utilized in high voltage direct current (HVDC) cable accessories due to its exceptional insulation properties. The microscopic reactions and space charge characteristics of EPDM under electric fields are studied using density functional theory. The results indicate [...] Read more.
(This article belongs to the Special Issue Advance in New Energy Materials and Devices (/journal/polymers/special_issues/Energy_Mater_Dev))

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Nanostructuring Biobased Epoxy Resin with PEO-PPO-PEO Block Copolymer (/2073-4360/15/5/1216)

by Irati Barandiaran (https://sciprofiles.com/profile/399270?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Joseba Gomez-Hermoso-de-Mendoza (https://sciprofiles.com/profile/1237174?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Junkal Gutierrez (https://sciprofiles.com/profile/424008?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Agnieszka Tercjak (https://sciprofiles.com/profile/637820?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Galder Kortaberria (https://sciprofiles.com/profile/1454188?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1216; https://doi.org/10.3390/polym15051216 (https://doi.org/10.3390/polym15051216) - 28 Feb 2023

Abstract A biobased diglycidyl ether of vanillin (DGEVA) epoxy resin was nanostructured by poly(ethylene oxide-b-propylene oxide-b-ethylene oxide) (PEO-PPO-PEO) triblock copolymer. Due to the miscibility/immiscibility properties of the triblock copolymer in DGEVA resin, different morphologies were obtained depending on the triblock copolymer amount. A hexagonally [...] Read more.

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Physicochemical Characterization and Antioxidant Properties of Chitosan and Sodium Alginate Based Films Incorporated with Ficus Extract (/2073-4360/15/5/1215)

by Saurabh Bhatia (https://sciprofiles.com/profile/2101820?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ahmed Al-Harrasi (https://sciprofiles.com/profile/25352?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Yasir Abbas Shah (https://sciprofiles.com/profile/2735601?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Muhammad Jawad (https://sciprofiles.com/profile/author/NGRaZU0rM2pqRXZxRWxsVkpBM05QOGdES0hKMjMrS0RrSkN6d2lidmF5OD0=?utm , Mohammed Said Al-Azri (https://sciprofiles.com/profile/2679958?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name , Sana Ullah (https://sciprofiles.com/profile/author/ZUVYcitFM1ZZR2xhUFNZbXZTejJvbFRMSldmQlg3SEFzemRuNVNEY1FuTT0=?utm_source=r , Md Khalid Anwer (https://sciprofiles.com/profile/975548?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Mohammed F. Aldawsari (https://sciprofiles.com/profile/855201?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) , Esra Koca (https://sciprofiles.com/profile/2751276?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Levent Yurdaer Aydemir (https://sciprofiles.com/profile/2075381?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name

Polymers **2023**, *15*(5), 1215; https://doi.org/10.3390/polym15051215 (https://doi.org/10.3390/polym15051215) - 28 Feb 2023

Abstract Aqueous extract of fruit obtained from *Ficus racemosa* enriched with phenolic components was used for the first time to fabricate chitosan (CS) and sodium alginate (SA)-based edible films. The edible films supplemented with Ficus fruit aqueous extract (FFE) were characterized physiochemically (using Fourier [...] Read more.

(This article belongs to the Special Issue **Advances in Biodegradable Polymeric Materials with Applications in the Food Industry (/journal/polymers/special_issues/Biodegradable_Polymeric_Materials_Applications_Food_Industry)**)

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Thermal and Electrical Properties of Additively Manufactured Polymer–Boron Nitride Composite (/2073-4360/15/5/1214)

by Julia V. Bondareva (https://sciprofiles.com/profile/1347088?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Daniil A. Chernodoubov (https://sciprofiles.com/profile/2767958?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name, Oleg N. Dubinin (https://sciprofiles.com/profile/1742122?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Andrey A. Tikhonov (https://sciprofiles.com/profile/1228040?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Alexey P. Simonov (https://sciprofiles.com/profile/1407628?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Nikolay V. Suetin (https://sciprofiles.com/profile/author/ZUs4KzZCN1lMc0xBL0wzZnpScWxDUT09?utm_source=mdpi.com&utm_medium=web, Mikhail A. Tarkhov (https://sciprofiles.com/profile/2800565?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Zakhar I. Popov (https://sciprofiles.com/profile/342561?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Dmitry G. Kvashnin (https://sciprofiles.com/profile/590554?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Stanislav A. Evlashin (https://sciprofiles.com/profile/805970?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Alexander A. Safonov (https://sciprofiles.com/profile/735816?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1214; https://doi.org/10.3390/polym15051214 (https://doi.org/10.3390/polym15051214) - 28 Feb 2023

Abstract The efficiency of electronic microchip-based devices increases with advancements in technology, while their size decreases. This miniaturization leads to significant overheating of various electronic components, such as power transistors, processors, and power diodes, leading to a reduction in their lifespan and reliability. To [...] Read more.

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Amniotic Membrane Biopolymer for Regenerative Medicine (/2073-4360/15/5/1213)

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Polymers **2023**, *15*(5), 1213; https://doi.org/10.3390/polym15051213 (https://doi.org/10.3390/polym15051213) - 28 Feb 2023

Abstract Biopolymers based on the amniotic membrane compare favorably with synthetic materials in that, along with a specific 2D structure, they have biologically active properties. However, in recent years, there has been a tendency to perform decellularization of the biomaterial during the preparation of [...] Read more.

(This article belongs to the Special Issue **Biopolymers for Regenerative Medicine Applications (/journal/polymers/special_issues/biopolymers_regenerative_medicine)**)

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Preparation and Characterization of New Bioplastics Based on Polybutylene Succinate (PBS) (/2073-4360/15/5/1212)

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Chiara Schiraldi (https://sciprofiles.com/profile/417216?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Juan López-Martínez (https://sciprofiles.com/profile/1535662?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and María Dolores Samper (https://sciprofiles.com/profile/503101?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1212; https://doi.org/10.3390/polym15051212 (https://doi.org/10.3390/polym15051212) - 28 Feb 2023

Abstract Sea and environmental pollution due to microplastics are global problems that in recent years have attracted particular interest in the scientific community. The increase in the world population and the consequent consumerism of non-reusable materials are amplifying these problems. In this manuscript, we [...] Read more.

(This article belongs to the Special Issue **Advances in Biodegradable Polymeric Materials with Applications in the Food Industry (/journal/polymers/special_issues/Biodegradable_Polymeric_Materials_Applications_Food_Industry)**)

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Performance Evaluation of Hot Mix Asphalt (HMA) Containing Polyethylene Terephthalate (PET) Using Wet and Dry Mixing Techniques (/2073-4360/15/5/1211)

by Nisma Agha (https://sciprofiles.com/profile/1886527?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Arshad Hussain (https://sciprofiles.com/profile/2359886?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Agha Shah Ali (https://sciprofiles.com/profile/2440281?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Yanjun Qiu (https://sciprofiles.com/profile/812515?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1211; https://doi.org/10.3390/polym15051211 (https://doi.org/10.3390/polym15051211) - 27 Feb 2023

Abstract This study evaluates the performance of Polyethylene Terephthalate (PET)-modified hot mix asphalt. Aggregate, bitumen of grade 60/70 and crushed plastic bottle waste were utilized in this study. Polymer Modified Bitumen (PMB) was prepared using a high shear laboratory type mixer rotating at a [...] Read more.

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Open Access Article (/2073-4360/15/5/1210/pdf?version=1677753217)

Synthesis of Ruthenium-Promoted ZnO/SBA-15 Composites for Enhanced Photocatalytic Degradation of Methylene Blue Dye (/2073-4360/15/5/1210)

by Dănuţa Matei (https://sciprofiles.com/profile/2497829?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1210; https://doi.org/10.3390/polym15051210 (https://doi.org/10.3390/polym15051210) - 27 Feb 2023

Abstract Synthetic organic pigments like xanthene and azo dyes from the direct discharge of textile effluents are considered colossal global issues and attract the concern of scholars. Photocatalysis continues to be a very valuable pollution control method for industrial wastewater. Incorporations of metal oxide [...] Read more.

(This article belongs to the Special Issue **Application of Polymer Materials in Water Treatment (/journal/polymers/special_issues/Appl_Polym_Mater_Water_Treat)**)

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Open Access Article (/2073-4360/15/5/1209/pdf?version=1677574214)

Study of Candelilla Wax Concentrations on the Physical Properties of Edible Nanocoatings as a Function of Support Polysaccharides (/2073-4360/15/5/1209)

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Polymers **2023**, *15*(5), 1209; https://doi.org/10.3390/polym15051209 (https://doi.org/10.3390/polym15051209) - 27 Feb 2023

Abstract Solid lipid nanoparticles (SLN) based on candelilla wax were prepared using the hot homogenization technique. The resulting suspension had monomodal behavior with a particle size of 809–885 nm; polydispersity index < 0.31, and zeta potential of −3.5 mV 5 weeks after monitoring. The [...] Read more.

(This article belongs to the Special Issue **New Developments in Fiber-Reinforced Polymer Composites (/journal/polymers/special_issues/Polymers_Fiber_Mechanical_Behavior)**)

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Assessment of Thermochromic Packaging Prints' Resistance to UV Radiation and Various Chemical Agents (/2073-4360/15/5/1208)

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Polymers **2023**, *15*(5), 1208; https://doi.org/10.3390/polym15051208 (https://doi.org/10.3390/polym15051208) - 27 Feb 2023

Abstract Thermochromic inks, also known as color changing inks, are becoming increasingly important for various applications that range from smart packaging, product labels, security printing, and anti-counterfeit inks to applications such as temperature-sensitive plastics and inks printed onto ceramic mugs, promotional items, and toys. [...] Read more.
(This article belongs to the Special Issue Active and Intelligent Food Packaging Polymers (/journal/polymers/special_issues/Act_Intell_Food_Packag_Polym))

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Structure of Starch–Sepiolite Bio-Nanocomposites: Effect of Processing and Matrix–Filler Interactions (/2073-4360/15/5/1207)

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Polymers **2023**, *15*(5), 1207; https://doi.org/10.3390/polym15051207 (https://doi.org/10.3390/polym15051207) - 27 Feb 2023

Abstract Sepiolite clay is a natural filler particularly suitable to be used with polysaccharide matrices (e.g., in starch-based bio-nanocomposites), increasing their attractiveness for a wide range of applications, such as packaging. Herein, the effect of the processing (i.e., starch gelatinization, addition of glycerol as [...] Read more.
(This article belongs to the Special Issue Decarbonization of Plastics (/journal/polymers/special_issues/XPHZ6739PR))

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Open Access Article (/2073-4360/15/5/1206/pdf?version=1677509279)

Combination of Cellulose Derivatives and Chitosan-Based Polymers to Investigate the Effect of Permeation Enhancers Added to In Situ Nasal Gels for the Controlled Release of Loratadine and Chlorpheniramine (/2073-4360/15/5/1206)

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Polymers **2023**, *15*(5), 1206; https://doi.org/10.3390/polym15051206 (https://doi.org/10.3390/polym15051206) - 27 Feb 2023

Abstract The purpose of the study is to develop and assess mucoadhesive in situ nasal gel formulations of loratadine and chlorpheniramine maleate to advance the bioavailability of the drug as compared to its conventional dosage forms. The influence of various permeation enhancers, such as **[...] Read more.**
(This article belongs to the Special Issue **Chitosan, Chitin, and Cellulose Nanofiber Biomaterials II (/journal/polymers/special_issues/LG3OL55E2F)**)

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Open Access Review (/2073-4360/15/5/1205/pdf?version=1677678245)

Therapeutic Efficacy of Polymeric Biomaterials in Treating Diabetic Wounds—An Upcoming Wound Healing Technology (/2073-4360/15/5/1205)

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Polymers **2023**, *15*(5), 1205; https://doi.org/10.3390/polym15051205 (https://doi.org/10.3390/polym15051205) - 27 Feb 2023

Abstract Diabetic wounds are one of the serious, non-healing, chronic health issues faced by individuals suffering from diabetic mellitus. The distinct phases of wound healing are either prolonged or obstructed, resulting in the improper healing of diabetic wounds. These injuries require persistent wound care [...] Read more.

(This article belongs to the Special Issue **Advances in Biocompatible and Biodegradable Polymers II (/journal/polymers/special_issues/biocompat_biodegrad_polym_II)**)

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Refined Spherulites of PP Induced by Supercritical N_2 and Graphite Nanosheet and Foaming Performance (/2073-4360/15/5/1204)

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Polymers **2023**, *15*(5), 1204; https://doi.org/10.3390/polym15051204 (https://doi.org/10.3390/polym15051204) - 27 Feb 2023

Abstract The isothermal crystallization properties of polypropylene/graphite nanosheet (PP/GN) nanocomposites under supercritical N_2 were systematically studied by a self-made in situ high-pressure microscope system. The results showed that the GN caused irregular lamellar crystals to form within the spherulites due to its effect [...] Read more.

(This article belongs to the Special Issue **Innovative Injection Molding and Polymer Processing Technology (/journal/polymers/special_issues/VZ510QC093)**)

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[Longitudinal Study on the Antimicrobial Performance of a Polyhexamethylene Biguanide (PHMB)-Treated Textile Fabric in a Hospital Environment (/2073-4360/15/5/1203)]

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Polymers **2023**, *15*(5), 1203; https://doi.org/10.3390/polym15051203 (https://doi.org/10.3390/polym15051203) - 27 Feb 2023

Abstract Healthcare workers in the hospital environment are at risk of infection and body fluids such as saliva, bacterial contamination, oral bacteria, etc. directly or indirectly exacerbate this issue. These bio-contaminants, when adhered to hospital linens and clothing, grow substantially, as conventional textile products [...] Read more.

(This article belongs to the Special Issue Develop Antimicrobial Polymer Textiles for Medical Applications (/journal/polymers/special_issues/Develop_Antimicrobial_Textiles))

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Open Access Review [(/2073-4360/15/5/1202/pdf?version=1677571557)]

[Biofunctionalization and Applications of Polymeric Nanofibers in Tissue Engineering and Regenerative Medicine (/2073-4360/15/5/1202)]

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Polymers **2023**, *15*(5), 1202; https://doi.org/10.3390/polym15051202 (https://doi.org/10.3390/polym15051202) - 27 Feb 2023

Abstract The limited ability of most human tissues to regenerate has necessitated the interventions namely autograft and allograft, both of which carry the limitations of its own. An alternative to such interventions could be the capability to regenerate the tissue in vivo.Regeneration of tissue [...] Read more.

(This article belongs to the Special Issue Polymeric Nanoparticles for Biomedical Applications (/journal/polymers/special_issues/polym_nanoparticles_biomed_appli))

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Open Access Article [(/2073-4360/15/5/1201/pdf?version=1677657243)]

[Preparation of Immobilised 17β-Estradiol-Imprinted Nanoparticles onto Bacterial Cellulose Nanofibres to Use for the Removal of 17β-Estradiol from Wastewater (/2073-4360/15/5/1201)]

by
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Polymers **2023**, *15*(5), 1201; https://doi.org/10.3390/polym15051201 (https://doi.org/10.3390/polym15051201) - 27 Feb 2023

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Abstract Estradiol, a phenolic steroid oestrogen, is one of the endocrine-disrupting chemicals (EDCs) found in natural and tap waters. The detection and removal of EDCs is attracting attention daily as they negatively affect animals' and humans' endocrine functions and physiological conditions. Therefore, developing a **[...] Read more.**
(This article belongs to the Special Issue **Recent Advances in Molecularly Imprinted Polymers and Emerging Polymeric Technologies for Hazardous Compounds (/journal/polymers/special_issues/5QW5NDW79D)**)

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Open Access Article **(/2073-4360/15/5/1200/pdf?version=1677498194)**

Application of Unsupervised Learning for the Evaluation of Burial Behavior of Geomaterials in Peatlands: Case of Lignin Moieties Yielded by Alkaline Oxidative Cleavage (/2073-4360/15/5/1200)

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Polymers **2023**, *15*(5), 1200; **https://doi.org/10.3390/polym15051200 (https://doi.org/10.3390/polym15051200)** - 27 Feb 2023

Abstract Tropical Peatlands accumulate organic matter (OM) and a significant source of carbon dioxide (CO_2) and methane (CH_4) under anoxic conditions. However, it is still ambiguous where in the peat profile these OM and gases are produced. The composition of **[...] Read more.**
(This article belongs to the Special Issue **Natural Degradation: Management of Polymer Degradation (/journal/polymers/special_issues/3FXG0G80XN)**)

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Open Access Article **(/2073-4360/15/5/1199/pdf?version=1677499631)**

Study on the Influence of Microinjection Molding Processing Parameters on Replication Quality of Polylactic Acid Microneedle Array Product (/2073-4360/15/5/1199)

by
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Polymers **2023**, *15*(5), 1199; **https://doi.org/10.3390/polym15051199 (https://doi.org/10.3390/polym15051199)** - 27 Feb 2023

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Abstract Biodegradable microneedles with a drug delivery channel have enormous potential for consumers, including use in chronic disease, vaccines, and beauty applications, due to being painless and scarless. This study designed a microinjection mold to fabricate a biodegradable polylactic acid (PLA) in-plane microneedle array [...] Read more.
(This article belongs to the Special Issue Advances in Polymer Processing and Molding (/journal/polymers/special_issues/Advances_Polymer_Processing_Molding))

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Open Access Article (/2073-4360/15/5/1198/pdf?version=1677494496)

Adjusting Surface Models of Cellular Structures for Making Physical Models Using FDM Technology (/2073-4360/15/5/1198)

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Polymers **2023**, *15*(5), 1198; https://doi.org/10.3390/polym15051198 (https://doi.org/10.3390/polym15051198) - 27 Feb 2023

Abstract In the planning stage of the fabrication process of physical models of cellular structures, a surface model of the structure needs to be adjusted to acquire the requisite properties, but errors emerge frequently at this stage. The main objective of this research was [...] Read more.
(This article belongs to the Section Polymer Physics and Theory (/journal/polymers/sections/Phys_Theory))

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Open Access Article (/2073-4360/15/5/1197/pdf?version=1677494409)

Preparation and Characterization of a Renewable Starch-g-(MA-DETA) Copolymer and Its Adjustment for Dye Removal Applications (/2073-4360/15/5/1197)

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Polymers **2023**, *15*(5), 1197; https://doi.org/10.3390/polym15051197 (https://doi.org/10.3390/polym15051197) - 27 Feb 2023

Abstract Maleic anhydride-diethylenetriamine grafted on starch (st-g-(MA-DETA)) was synthesized through graft copolymerization, and the different parameters (copolymerization temperature, reaction time, concentration of initiator and monomer concentration) affecting starch graft percentage were studied to achieve the maximum grafting percentage. The maximum grafting percentage was found [...] Read more.

(This article belongs to the Special Issue Polymer Materials for Wastewater Treatment (/journal/polymers/special_issues/WSI87I305Q))

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Open Access Review (/2073-4360/15/5/1196/pdf?version=1677547364)

Recent Advances in the Investigation of Poly(lactic acid) (PLA) Nanocomposites: Incorporation of Various Nanofillers and their Properties and Applications (/2073-4360/15/5/1196)

by
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Polymers **2023**, *15*(5), 1196; https://doi.org/10.3390/polym15051196 (https://doi.org/10.3390/polym15051196) - 27 Feb 2023

Abstract Poly(lactic acid) (PLA) is considered the most promising biobased substitute for fossil-derived polymers due to its compostability, biocompatibility, renewability, and good thermomechanical properties. However, PLA suffers from several shortcomings, such as low heat distortion temperature, thermal resistance, and rate of crystallization, whereas some [...] Read more.

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Open Access Article **(/2073-4360/15/5/1195/pdf?version=1677490340)**

Evaluation of Composites Reinforced by Processed and Unprocessed Coconut Husk Powder (/2073-4360/15/5/1195)

by
David Coverdale Rangel Velasco (https://sciprofiles.com/profile/author/UjVPclFVL0c0bWRoV0xYU1lheUt0L28vZ2cvNzdwSm9lMjBsM1RyQ3NL
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Polymers **2023**, *15*(5), 1195; **https://doi.org/10.3390/polym15051195 (https://doi.org/10.3390/polym15051195)** - 27 Feb 2023

Abstract Engineering activities aim to satisfy the demands of society. Not only should the economic and technological aspects be considered, but also the socio-environmental impact. In this sense, the development of composites with the incorporation of waste has been highlighted, aiming not only for **[...] Read more.**
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Enhanced Sorption of Europium and Scandium Ions from Nitrate Solutions by Remotely Activated Ion Exchangers (/2073-4360/15/5/1194)

by Aldan Imangazy (https://sciprofiles.com/profile/1580437?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Talkybek Jumadilov (https://sciprofiles.com/profile/1606808?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Khuangul Khimersen (https://sciprofiles.com/profile/3118657?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and
Arman Bayshibekov (https://sciprofiles.com/profile/author/bVcrVlZYcVpGd2F1YXBUZDdmdFhMQT09?utm_source=mdpi.com&utm_medium=
Polymers **2023**, *15*(5), 1194; https://doi.org/10.3390/polym15051194 (https://doi.org/10.3390/polym15051194) - 27 Feb 2023

Abstract The escalating demand for rare earth metals (REM) in situations of limited availability has spurred scientists to seek alternative sources of REM, such as industrial waste solutions. This paper investigates the potential for improving the sorption activity of readily available and inexpensive ion [...] Read more.
(This article belongs to the Special Issue **Recent Polymer-Based Advanced Materials: Designing, Structural Analysis and Use in Wastewater Remediation (/journal/polymers/special_issues/Recent_Polymer_Based_Advanced_Materials_Design_Structural_Analysis_Use_Wastewater_Remediation)**)

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Lignin-Loaded Carbon Nanoparticles as a Promising Control Agent against *Fusarium verticillioides* in Maize: Physiological and Biochemical Analyses (/2073-4360/15/5/1193)

by
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Mohamed A. Mosa (https://sciprofiles.com/profile/540883?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ahmed Mahmoud Ismail (https://sciprofiles.com/profile/2688469?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name
and
Ashraf E. Khalil (https://sciprofiles.com/profile/author/bzBpclU5VTJ1RVAxTmtwZ3hWTCtRU0xqc2NDak1XbWp0WWMvWkhJL0lzOD0=?utm_s
Polymers **2023**, *15*(5), 1193; https://doi.org/10.3390/polym15051193 (https://doi.org/10.3390/polym15051193) - 27 Feb 2023

Abstract Lignin, a naturally occurring biopolymer, is produced primarily as a waste product by the pulp and paper industries and burned to produce electricity. Lignin-based nano- and microcarriers found in plants are promising biodegradable drug delivery platforms. Here, we highlight a few characteristics of [...] Read more.
(This article belongs to the Special Issue **Polymers: Environmental Aspects (/journal/polymers/special_issues/0VK4XQ5X4A)**)

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Cytotoxicity Analysis for the Hydroxyl Functionalized MWCNT Reinforced PMMA Nanocomposites in Oral Squamous Carcinoma (KB) Cells (/2073-4360/15/5/1192)

by Vijay Patel (https://sciprofiles.com/profile/2512886?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Unnati Joshi (https://sciprofiles.com/profile/2718926?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Anand Joshi (https://sciprofiles.com/profile/2392968?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Tarun Kumar Upadhyay (https://sciprofiles.com/profile/817939?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Lamya Ahmed Al-Keridis (https://sciprofiles.com/profile/2112438?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_nam and Mohd Saeed (https://sciprofiles.com/profile/326562?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1192; https://doi.org/10.3390/polym15051192 (https://doi.org/10.3390/polym15051192) - 27 Feb 2023

Abstract In this particular research study, a unique three-dimensional mixing technique was used to incorporate multi-walled carbon nanotubes (MWCNTs) into polymethyl methacrylate (PMMA), and the KB cell line was used in the analysis of cytotoxicity, apoptosis detection, and cell viability using the MTT assay **[...] Read more.**
(This article belongs to the Special Issue **Advanced Carbon-Based Polymer Nanocomposites (/journal/polymers/special_issues/V79RFBL8I1)**)

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Methods and Characteristics of Drug Extraction from Ion-Exchange-Resin-Mediated Preparations: Influences, Thermodynamics, and Kinetics (/2073-4360/15/5/1191)

by Junlin Yuan (https://sciprofiles.com/profile/2592485?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Conghui Li (https://sciprofiles.com/profile/1937419?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Shanshan Wang (https://sciprofiles.com/profile/author/cG13aWxEQTZhQXorTVRUMWRHbDhmRHpLTnhNSDBSeXM0MEwrdTlTMG8vbz0=?utm , Hui Zhang (https://sciprofiles.com/profile/907969?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Zengming Wang (https://sciprofiles.com/profile/1817367?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Aiping Zheng (https://sciprofiles.com/profile/1909026?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Xiuli Gao (https://sciprofiles.com/profile/1117329?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1191; https://doi.org/10.3390/polym15051191 (https://doi.org/10.3390/polym15051191) - 27 Feb 2023

Abstract Since the discovery of ion-exchange resins, they have been used in many fields, including pharmacy. Ion-exchange resin-mediated preparations can realize a series of functions, such as taste masking and regulating release. However, it is very difficult to extract the drug completely from the **[...]**
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Open Access Article **(/2073-4360/15/5/1190/pdf?version=1677484329)**

Transfer Length vs. Slip of Prestressed Fiber-Reinforced Polymer Reinforcement (/2073-4360/15/5/1190)

by
Aidas Jokūbaitis (https://sciprofiles.com/profile/2132274?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and
Juozas Valivonis (https://sciprofiles.com/profile/2132276?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1190; **https://doi.org/10.3390/polym15051190 (https://doi.org/10.3390/polym15051190)** - 27 Feb 2023

Abstract A comprehensive analysis of the relationship between transfer length and slip of different types of prestressed fiber reinforced polymer (FRP) reinforcement is provided. The results of the transfer length and slip together with the main influencing parameters of approximately 170 specimens prestressed with **[...] Read more.**
(This article belongs to the Special Issue **Development in Fiber-Reinforced Polymer Composites (/journal/polymers/special_issues/development_fiber_reinforced_poly_compo)**)

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Open Access Article **(/2073-4360/15/5/1189/pdf?version=1677478422)**

Enhancement in Mechanical Properties of Glass/Epoxy Composites by a Hybrid Combination of Multi-Walled Carbon Nanotubes and Graphene Nanoparticles (/2073-4360/15/5/1189)

by
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Polymers **2023**, *15*(5), 1189; **https://doi.org/10.3390/polym15051189 (https://doi.org/10.3390/polym15051189)** - 27 Feb 2023

Abstract In this work, an attempt was made to improve the mechanical performance of glass fibre-reinforced polymer composites by adding multi-walled carbon nanotubes (MWCNT) and graphene nanoparticles (GNP) and their hybrid combination at different weight fractions (0.1 to 0.3%). Composite laminates with three different **[...] Read more.**

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(This article belongs to the Special Issue **Processing and Characterization of Polymeric Composites (/journal/polymers/special_issues/G2T874MP49)**)

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Correlation Analysis and Prediction Model of Thermal Protection Performance of Aramid 1414 Fabric (/2073-4360/15/5/1188)

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Polymers **2023**, *15*(5), 1188; **https://doi.org/10.3390/polym15051188 (https://doi.org/10.3390/polym15051188)** - 27 Feb 2023

Abstract The thermal protection performance of fire suit is vital to the safety of firefighters. Using certain physical properties of fabrics to evaluate their thermal protection performance speeds up the process. This work aims to develop a TPP value prediction model that can be **[...] Read more.**
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Development of an Fe_3O_4 Surface-Grafted Carboxymethyl Chitosan Molecularly Imprinted Polymer for Specific Recognition and Sustained Release of Salidroside (/2073-4360/15/5/1187)

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Polymers **2023**, *15*(5), 1187; https://doi.org/10.3390/polym15051187 (https://doi.org/10.3390/polym15051187) - 27 Feb 2023

Abstract The choice of carrier material is critical in the study of natural drug release preparations and glycosylated magnetic molecularly imprinted materials. The stiffness and softness of the carrier material affect the efficiency of drug release and the specificity of recognition. The dual adjustable [...] Read more.
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Open Access Article (/2073-4360/15/5/1186/pdf?version=1678177535)

Ion-Imprinted Polymer Structurally Preorganized Using a Phenanthroline-Divinylbenzoate Complex with the Cu(II) Ion as Template and Some Adsorption Results (/2073-4360/15/5/1186)

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Polymers **2023**, *15*(5), 1186; https://doi.org/10.3390/polym15051186 (https://doi.org/10.3390/polym15051186) - 26 Feb 2023

Abstract The novel [Cuphen(VBA)$_2$H$_2$O] complex (phen: phenanthroline, VBA: vinylbenzoate) was prepared and used as a functional monomer to preorganize a new ion-imprinted polymer (IIP). By leaching the Cu(II) from the molecular imprinted polymer (MIP), [Cuphen(VBA)$_2$H$_2$O-*co* [...] Read more.
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Natural Fibre Composites and Their Mechanical Behaviour (/2073-4360/15/5/1185)

by

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Abstract At present, natural-fibre-reinforced-composites (NFRCs) are seen as realistic alternatives to synthetic- (e [...] **Full article (/2073-4360/15/5/1185)**

(This article belongs to the Special Issue **Natural Fibre Composites and Their Mechanical Behavior (/journal/polymers/special_issues/Natural_Fibre_Composites_Mechanical_Behavior)**)

Open Access Review (/2073-4360/15/5/1184/pdf?version=1677634124)

Approaches in Sustainable, Biobased Multilayer Packaging Solutions (/2073-4360/15/5/1184)

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Abstract The depletion of fossil resources and the growing demand for plastic waste reduction has put industries and academic researchers under pressure to develop increasingly sustainable packaging solutions that are both functional and circularly designed. In this review, we provide an overview of the **[...] Read more.**

(This article belongs to the Section **Polymer Membranes and Films (/journal/polymers/sections/Membr_Film)**)

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Open Access Article (/2073-4360/15/5/1183/pdf?version=1677412999)

Flame Retardancy and Mechanical Properties of Melt-Spun PA66 Fibers Prepared by End-Group Blocking Technology (/2073-4360/15/5/1183)

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Polymers **2023**, *15*(5), 1183; https://doi.org/10.3390/polym15051183 (https://doi.org/10.3390/polym15051183) - 26 Feb 2023

Abstract Preparing flame-retardant polyamide 66 (PA66) fibers through melt spinning remains one of the biggest challenges nowadays. In this work, dipentaerythritol (Di−PE), an eco-friendly flame retardant, was blended into PA66 to prepare PA66/Di−PE composites and fibers. It was confirmed that Di−PE could significantly improve [...] Read more.
(This article belongs to the Section Polymer Fibers (/journal/polymers/sections/Fiber))

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Intelligent *Eucommia ulmoides* Rubber/Ionomer Blends with Thermally Activated Shape Memory and Self-Healing Properties (/2073-4360/15/5/1182)

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Polymers **2023**, *15*(5), 1182; https://doi.org/10.3390/polym15051182 (https://doi.org/10.3390/polym15051182) - 26 Feb 2023

Abstract Intelligent *Eucommia ulmoides* rubber (EUR) and ionomer Surlyn resin (SR) blends were prepared and studied in this manuscript. This is the first paper to combine EUR with SR to prepare blends with both the shape memory effect and self-healing capability. The mechanical, curing, [...] Read more.
(This article belongs to the Section Smart and Functional Polymers (/journal/polymers/sections/Smart_Funct))

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Open Access Article (/2073-4360/15/5/1181/pdf?version=1677406304)

Fabrication of poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) Fibers Using Centrifugal Fiber Spinning: Structure, Properties and Application Potential (/2073-4360/15/5/1181)

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Polymers **2023**, *15*(5), 1181; https://doi.org/10.3390/polym15051181 (https://doi.org/10.3390/polym15051181) - 26 Feb 2023

Abstract Biobased and biodegradable polyhydroxyalkanoates (PHAs) are currently gaining momentum. Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx) polymer has a useful processing window for extrusion and injection molding of packaging, agricultural and fishery applications with required flexibility. Processing PHBHHx into fibers using electrospinning or centrifugal fiber spinning (CFS) can [...] Read more.

(This article belongs to the Special Issue **Synthesis and Applications of Polymeric Fibers and Textiles (/journal/polymers/special_issues/Polym_Fibers_Text)**)

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Correlations in Hard- and Soft-Core Generic Polymer Models (/2073-4360/15/5/1180)

by Qiang Wang (https://sciprofiles.com/profile/2761140?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1180; https://doi.org/10.3390/polym15051180 (https://doi.org/10.3390/polym15051180) - 26 Feb 2023

Abstract Generic polymer models capturing the chain connectivity and the non-bonded excluded-volume interactions between polymer segments can be classified into hard- and soft-core models depending on their non-bonded pair potential. Here we compared the correlation effects on the structural and thermodynamic properties of the [...] Read more.

(This article belongs to the Special Issue **Research on Polymer Simulation, Modeling and Computation (/journal/polymers/special_issues/Polym_Simul_Modeling)**)

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Open Access Article (/2073-4360/15/5/1179/pdf?version=1677722209)

Poly(ε-caprolactone)-poly(ethylene glycol) Tri-Block Copolymer as Quercetin Delivery System for Human Colorectal Carcinoma Cells: Synthesis, Characterization and In Vitro Study (/2073-4360/15/5/1179)

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Polymers **2023**, *15*(5), 1179; https://doi.org/10.3390/polym15051179 (https://doi.org/10.3390/polym15051179) - 26 Feb 2023

Abstract Quercetin is a hydrophobic molecule with short blood circulation times and instability. The development of a nano-delivery system formulation of quercetin may increase its bioavailability, resulting in greater tumor suppressing effects. Triblock ABA type polycaprolactone-polyethylenglycol-polycaprolactone (PCL-PEG-PCL) copolymers have been synthetized using ring-opening [...] Read more.
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Impact Performance of 3D Printed Spatially Varying Elastomeric Lattices (/2073-4360/15/5/1178)

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Polymers **2023**, *15*(5), 1178; https://doi.org/10.3390/polym15051178 (https://doi.org/10.3390/polym15051178) - 26 Feb 2023

Abstract Additive manufacturing is catalyzing a new class of volumetrically varying lattice structures in which the dynamic mechanical response can be tailored for a specific application. Simultaneously, a diversity of materials is now available as feedstock including elastomers, which provide high viscoelasticity and increased [...] Read more.
(This article belongs to the Special Issue Advanced Materials in 3D Printing Technology (/journal/polymers/special_issues/Advanced_Materials_3D_Printing_Technology))

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Open Access Review (/2073-4360/15/5/1177/pdf?version=1677659308)

Progress in Biomaterials for Cardiac Tissue Engineering and Regeneration (/2073-4360/15/5/1177)

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Polymers **2023**, *15*(5), 1177; https://doi.org/10.3390/polym15051177 (https://doi.org/10.3390/polym15051177) - 26 Feb 2023

Abstract Cardiovascular diseases are one of the leading global causes of morbidity and mortality, posing considerable health and economic burden on patients and medical systems worldwide. This phenomenon is attributed to two main motives: poor regeneration capacity of adult cardiac tissues and insufficient therapeutic [...] Read more.
(This article belongs to the Special Issue Biomaterials for Tissue Engineering and Regeneration II (/journal/polymers/special_issues/236ODS0OOH))

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Natural Rubber Composites Using Hydrothermally Carbonized Hardwood Waste Biomass as a Partial Reinforcing Filler- Part I: Structure, Morphology, and Rheological Effects during Vulcanization (/2073-4360/15/5/1176)

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Polymers **2023**, *15*(5), 1176; https://doi.org/10.3390/polym15051176 (https://doi.org/10.3390/polym15051176) - 26 Feb 2023

Abstract A new generation biomass-based filler for natural rubber, 'hydrochar' (HC), was obtained by hydrothermal carbonization of hardwood waste (sawdust). It was intended as a potential partial replacement for the traditional carbon black (CB) filler. The HC particles were found (TEM) to be much [...] Read more.
(This article belongs to the Special Issue Application of Functional Polymer Materials for Advanced Technologies (/journal/polymers/special_issues/WFH6OO03S5))

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Open Access Article (/2073-4360/15/5/1175/pdf?version=1677397975)

Effect of Denture Disinfectants on the Mechanical Performance of 3D-Printed Denture Base Materials (/2073-4360/15/5/1175)

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Polymers **2023**, *15*(5), 1175; https://doi.org/10.3390/polym15051175 (https://doi.org/10.3390/polym15051175) - 26 Feb 2023

Abstract Denture care and maintenance are necessary for both denture longevity and underlying tissue health. However, the effects of disinfectants on the strength of 3D-printed denture base resins are unclear. Herein, distilled water (DW), effervescent tablet, and sodium hypochlorite (NaOCl) immersion solutions were used [...] Read more.
(This article belongs to the Special Issue Progress in 3D Printing (/journal/polymers/special_issues/Prog_3D_Print))

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Open Access Review (/2073-4360/15/5/1174/pdf?version=1677397546)

Electrospun Nanomaterials Based on Cellulose and Its Derivatives for Cell Cultures: Recent Developments and Challenges (/2073-4360/15/5/1174)

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Polymers **2023**, *15*(5), 1174; https://doi.org/10.3390/polym15051174 (https://doi.org/10.3390/polym15051174) - 26 Feb 2023

Abstract The development of electrospun nanofibers based on cellulose and its derivatives is an inalienable task of modern materials science branches related to biomedical engineering. The considerable compatibility with multiple cell lines and capability to form unaligned nanofibrous frameworks help reproduce the properties of [...] Read more.
(This article belongs to the Special Issue Electrospinning Technology to Produce Innovative Nanostructured Polymer Materials: Current Applications and Future Perspectives (/journal/polymers/special_issues/Electrospinning_Technol))

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Three-Dimensional Printing of Recycled Polypropylene and Activated Carbon Coatings for Harmful Gas Adsorption and Antibacterial Properties (/2073-4360/15/5/1173)

by Jung Bin Park (https://sciprofiles.com/profile/2789717?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Seok Hwan An (https://sciprofiles.com/profile/2800049?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Jae Woong Jung (https://sciprofiles.com/profile/1138119?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Jea Uk Lee (https://sciprofiles.com/profile/182413?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1173; https://doi.org/10.3390/polym15051173 (https://doi.org/10.3390/polym15051173) - 26 Feb 2023

Abstract In recent years, the utilization of three-dimensional (3D) printing has been expanding due to advances in technology and economic efficiency. One of the 3D printing technologies is fused deposition modeling, which can be used to create different kinds of products or prototypes from **[...] Read more.**

(This article belongs to the Special Issue **Recycling, Reusing and Resource Recovery from Polymers (/journal/polymers/special_issues/Z8ES9XJARH)**)

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MMP-2 Silencing through siRNA Loaded Positively-Charged Nanoparticles (AcPEI-NPs) Counteracts Chondrocyte De-Differentiation (/2073-4360/15/5/1172)

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Polymers **2023**, *15*(5), 1172; https://doi.org/10.3390/polym15051172 (https://doi.org/10.3390/polym15051172) - 25 Feb 2023

Abstract The abnormal matrix remodeling process, as well as inflammation, angiogenesis, and tumor metastasis, are related to an increase in the synthesis and secretion of matrix metalloproteinases (MMPs), the zinc-dependent proteolytic endopeptidases. Recent studies have evidenced MMPs' role in osteoarthritis (OA) development, during which **[...] Read more.**

(This article belongs to the Special Issue **Polymer Nanomaterials-Mediated Delivery of Bioactive Molecules in Healthcare (/journal/polymers/special_issues/Polymer_Nanomaterials_Mediated_Delivery_Bioactive_Molecules_Healthcare)**)

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Independent Heating Performances in the Sub-Zero Environment of MWCNT/PDMS Composite with Low Electron-Tunneling Energy (/2073-4360/15/5/1171)

by
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Polymers **2023**, *15*(5), 1171; https://doi.org/10.3390/polym15051171 (https://doi.org/10.3390/polym15051171) - 25 Feb 2023

Abstract The structural stability of various structures (railroads, bridges, buildings, etc.) is lowered due to freezing because of the decreasing outside temperature in winter. To prevent damage from freezing, a technology for de-icing has been developed using an electric-heating composite. For this purpose, a [...] Read more.

(This article belongs to the Special Issue Polymers (or Adhesives) and Polymer Composites for Construction Application (/journal/polymers/special_issues/poly_adhesive_poly_compo_construction))

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Effect of Fiber Fraction on Ballistic Impact Behavior of 3D Woven Composites (/2073-4360/15/5/1170)

by Xiaoping Shi (https://sciprofiles.com/profile/2757776?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1170; https://doi.org/10.3390/polym15051170 (https://doi.org/10.3390/polym15051170) - 25 Feb 2023

Abstract This paper studies the ballistic impact performance of 3D woven composites (3DWCs) with hexagonal binding patterns. Para-aramid/polyurethane (PU) 3DWCs with three kinds of fiber volume fraction (V_f) were prepared by compression resin transfer molding (CRTM). The effect of V_f on [...] Read more.

(This article belongs to the Special Issue Polymer-Based Three-Dimensional (3D) Textile Composites (/journal/polymers/special_issues/Three_Dimensional_Text_Compos))

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Ultra-High Molecular Weight Polyethylene Modifications Produced by Carbon Nanotubes and Fe_2O_3 Nanoparticles (/2073-4360/15/5/1169)

by Lorenzo Torrisi (https://sciprofiles.com/profile/529576?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1169; https://doi.org/10.3390/polym15051169 (https://doi.org/10.3390/polym15051169) - 25 Feb 2023

Abstract Thin sheets of ultra-high molecular weight polyethylene (UHMWPE), both in pristine form and containing carbon nanotubes (CNTs) or Fe_2O_3 nanoparticles (NPs) at different concentrations, were prepared. The CNT and Fe_2O_3 NP weight percentages used ranged from 0.01% [...] Read more.

(This article belongs to the Special Issue **Innovative and Functionalized Polymers: Processing, Development and Applications (/journal/polymers/special_issues/A8L7E6X6R2)**)

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Formation of a Conducting Polymer by Different Electrochemical Techniques and Their Effect on Obtaining an Immunosensor for Immunoglobulin G (/2073-4360/15/5/1168)

by
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Polymers **2023**, *15*(5), 1168; https://doi.org/10.3390/polym15051168 (https://doi.org/10.3390/polym15051168) - 25 Feb 2023

Abstract In this work, a conducting polymer (CP) was obtained through three electrochemical procedures to study its effect on the development of an electrochemical immunosensor for the detection of immunoglobulin G (IgG-Ag) by square wave voltammetry (SWV). The glassy carbon electrode modified with poly [...] Read more.

(This article belongs to the Special Issue **Nanostructured Conducting Polymers (/journal/polymers/special_issues/X6A3147SXE)**)

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[Starch Nanoparticles: Preparation, Properties and Applications (/2073-4360/15/5/1167)]

by Merlina Marta (https://sciprofiles.com/profile/1994356?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Dina Intan Rizki (https://sciprofiles.com/profile/2696576?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Efri Mardawati (https://sciprofiles.com/profile/1739029?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Mohamad Djali (https://sciprofiles.com/profile/3091570?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Masita Mohammad (https://sciprofiles.com/profile/133690?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Yana Cahyana (https://sciprofiles.com/profile/1362500?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1167; https://doi.org/10.3390/polym15051167 (https://doi.org/10.3390/polym15051167) - 25 Feb 2023

Abstract Starch as a natural polymer is abundant and widely used in various industries around the world. In general, the preparation methods for starch nanoparticles (SNPs) can be classified into 'top-down' and 'bottom-up' methods. SNPs can be produced in smaller sizes and used to [...] Read more.

(This article belongs to the Special Issue Polymer Nanoparticles: Synthesis and Applications (/journal/polymers/special_issues/polymer_nanoparticles_synthesis_applications))

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[DFT and ONIOM Simulation of 1,3-Butadiene Polymerization Catalyzed by Neodymium-Based Ziegler–Natta System (/2073-4360/15/5/1166)]

by Alexey N. Masliy (https://sciprofiles.com/profile/2488713?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ildar G. Akhmetov (https://sciprofiles.com/profile/2773524?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Andrey M. Kuznetsov (https://sciprofiles.com/profile/author/MWhBUThzY2VrSnVwZE5wbzZkazZwVWphZDZMS0ZmdGwrT1E4QWJWeDcycz0= and Ilsiya M. Davletbaeva (https://sciprofiles.com/profile/664454?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1166; https://doi.org/10.3390/polym15051166 (https://doi.org/10.3390/polym15051166) - 25 Feb 2023

Abstract Using modern methods of quantum chemistry, a theoretical substantiation of the high *cis*-stereospecificity of 1,3-butadiene polymerization catalyzed by the neodymium-based Ziegler–Natta system was carried out. For DFT and ONIOM simulation, the most *cis*-stereospecific active site of the catalytic system was used. [...] Read more.

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[Improving the Integrated Fabrication of Insulation Systems in Electric Drives by Injection Molding of Thermosets Due to Processing Conditions and Slot Design (/2073-4360/15/5/1165)]

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Polymers **2023**, *15*(5), 1165; https://doi.org/10.3390/polym15051165 (https://doi.org/10.3390/polym15051165) - 25 Feb 2023

Abstract The expanding demand for electro mobility in general and specifically for electrified vehicles requires the expansion of electro mobility technology with respect to variations in the requirements of the process and the application. Within the stator, the electrical insulation system has a high [...] Read more.

(This article belongs to the Collection Plastics Technology and Engineering (/journal/polymers/topical_collections/Plastics_Technology_Engineering))

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Experimental and Numerical Investigation of the Mechanical Properties of 3D-Printed Hybrid and Non-Hybrid Composites (/2073-4360/15/5/1164)

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Polymers **2023**, *15*(5), 1164; https://doi.org/10.3390/polym15051164 (https://doi.org/10.3390/polym15051164) - 25 Feb 2023

Abstract Recent research efforts have highlighted the potential of hybrid composites in the context of additive manufacturing. The use of hybrid composites can lead to an enhanced adaptability of the mechanical properties to the specific loading case. Furthermore, the hybridization of multiple fiber materials [...] Read more.

(This article belongs to the Special Issue **Additive Manufacturing of Polymer-Based Composite Materials (/journal/polymers/special_issues/DJ5PE7585A)**)

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Hybrid Carbon Nanocomposites Made of Aerospace-Grade Epoxy Showing Synergistic Effects in Electrical Properties and High Processability (/2073-4360/15/5/1163)

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Polymers **2023**, *15*(5), 1163; **https://doi.org/10.3390/polym15051163 (https://doi.org/10.3390/polym15051163)** - 25 Feb 2023
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Abstract In this work, we investigate the processability and the volumetric electrical properties of nanocomposites made of aerospace-grade RTM6, loaded with different carbon nanoparticles. Nanocomposites with graphene nanoplatelets (GNP), single-walled carbon nanotubes (SWCNT) and hybrid GNP/SWCNT in the ratio 2:8 (GNP_2SWCNT_8 **[...] Read more.**

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Open Access Article (/2073-4360/15/5/1162/pdf?version=1678241677)

Prediction of The Mechanical Behavior of Polylactic Acid Parts with Shape Memory Effect Fabricated by FDM (/2073-4360/15/5/1162)

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Polymers **2023**, *15*(5), 1162; **https://doi.org/10.3390/polym15051162 (https://doi.org/10.3390/polym15051162)** - 25 Feb 2023
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Abstract In this study, the mechanical as well as thermomechanical behaviors of shape memory PLA parts are presented. A total of 120 sets with five variable printing parameters were printed by the FDM method. The impact of the printing parameters on the tensile strength, **[...] Read more.**
(This article belongs to the Special Issue **Mechanical Behavior of Polymeric Materials: Recent Study (/journal/polymers/special_issues/Mechanical_Behavior_Polymers)**)

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Open Access Article (/2073-4360/15/5/1161/pdf?version=1677576208)

Prediction of Ultimate Capacity of Concrete Columns Reinforced with FRP Bars (/2073-4360/15/5/1161)

by Jacek Korentz (https://sciprofiles.com/profile/1096071?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and
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Polymers **2023**, *15*(5), 1161; **https://doi.org/10.3390/polym15051161 (https://doi.org/10.3390/polym15051161)** - 25 Feb 2023
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Abstract FRP bars are used in concrete structures as an alternative to steel bars as they have many advantages such as high tensile strength, high strength-to-weight ratio, electromagnetic neutrality, lightweight and no corrosion. There is a perceived lack of standard regulations for the design **[...] Read more.**

(This article belongs to the Special Issue **Fibre Reinforced Polymer (FRP) Composites in Structural Applications (/journal/polymers/special_issues/Fibre_Reinf_Polym_Compos_Struct_Appl)**)

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Open Access Review **(/2073-4360/15/5/1160/pdf?version=1677648158)**

Multifunctional Self-Assembled Peptide Hydrogels for Biomedical Applications (/2073-4360/15/5/1160)

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Polymers **2023**, *15*(5), 1160; **https://doi.org/10.3390/polym15051160 (https://doi.org/10.3390/polym15051160)** - 25 Feb 2023

Abstract Self-assembly is a growth mechanism in nature to apply local interactions forming a minimum energy structure. Currently, self-assembled materials are considered for biomedical applications due to their pleasant features, including scalability, versatility, simplicity, and inexpensiveness. Self-assembled peptides can be applied to design and **[...] Read more.**

(This article belongs to the Special Issue **Biomedical Applications of Intelligent Hydrogel (/journal/polymers/special_issues/Biomedical_Applications_Intelligent_Hydrogel)**)

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Open Access Article (/2073-4360/15/5/1159/pdf?version=1677307622)

Influence of Mechanical Properties on the Piezoelectric Response of UV-Cured Composite Films Containing Different ZnO Morphologies (/2073-4360/15/5/1159)

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Ambra Fioravanti (https://sciprofiles.com/profile/574912?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Giulio Malucelli (https://sciprofiles.com/profile/150333?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1159; https://doi.org/10.3390/polym15051159 (https://doi.org/10.3390/polym15051159) - 25 Feb 2023

Abstract ZnO flower-like (ZFL) and needle (ZLN) structures were synthesized and embedded into UV-curable acrylic resin (EB), with the aim to study the effect of filler loading on the piezoelectric properties of the resulting composite films. The composites showed uniform dispersion of fillers within [...] Read more.
(This article belongs to the Special Issue **Surface and Interface of Polymer Nanocomposites (/journal/polymers/special_issues/R24YI50N4S)**)

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Particleboard Production from *Paulownia tomentosa* (Thunb.) Steud. Grown in Portugal (/2073-4360/15/5/1158)

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Polymers **2023**, *15*(5), 1158; https://doi.org/10.3390/polym15051158 (https://doi.org/10.3390/polym15051158) - 24 Feb 2023

Abstract Paulownia wood has raised high attention due to its rapid growth and fire resistance. The number of plantations in Portugal has been growing, and new exploitation methods are needed. This study intends to determine the properties of particleboards made with very young Paulownia [...] Read more.
(This article belongs to the Topic **Polymers from Renewable Resources (/topics/polymers_renewable)**)

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Superparamagnetic Multifunctionalized Chitosan Nanohybrids for Efficient Copper Adsorption: Comparative Performance, Stability, and Mechanism Insights (/2073-4360/15/5/1157)

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Polymers **2023**, *15*(5), 1157; https://doi.org/10.3390/polym15051157 (https://doi.org/10.3390/polym15051157) - 24 Feb 2023

Abstract To limit the dangers posed by Cu(II) pollution, chitosan-nanohybrid derivatives were developed for selective and rapid copper adsorption. A magnetic chitosan nanohybrid (r-MCS) was obtained via the co-precipitation nucleation of ferroferric oxide (Fe_3O_4) co-stabilized within chitosan, followed by further **[...] Read more.**
(This article belongs to the Special Issue **Advanced Polymer Composite Materials: Processing, Modeling, Properties and Applications II (/journal/polymers/special_issues/D8B397QW9T)**)

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Development of Benzobisoxazole-Based Novel Conjugated Polymers for Organic Thin-Film Transistors (/2073-4360/15/5/1156)

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Polymers **2023**, *15*(5), 1156; https://doi.org/10.3390/polym15051156 (https://doi.org/10.3390/polym15051156) - 24 Feb 2023

Abstract Benzo[1,2-d:4,5-d′]bis(oxazole) (BBO) is a heterocyclic aromatic ring composed of one benzene ring and two oxazole rings, which has unique advantages on the facile synthesis without any column chromatography purification, high solubility on the common organic solvents and planar fused aromatic ring structure. However, [...] Read more.

(This article belongs to the Special Issue **Polymer Based Electronic Devices and Sensors II (/journal/polymers/special_issues/MHPN9Z7DD2)**)

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Synthesis, Properties, and Biodegradability of Novel Sequence-Controlled Copolyesters Composed of Glycolic Acid, Dicarboxylic Acids, and C_3 or C_4 Diols (/2073-4360/15/5/1155)

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Polymers **2023**, *15*(5), 1155; https://doi.org/10.3390/polym15051155 (https://doi.org/10.3390/polym15051155) - 24 Feb 2023

Abstract We have previously reported that sequence-controlled copolyesters such as poly((ethylene diglycolate) terephthalate) (poly(GEGT)) showed higher melting temperatures than those of the corresponding random copolymers and high biodegradability in seawater. In this study, to elucidate the effect of the diol component on their properties, [...] Read more.

(This article belongs to the Special Issue **Recent Advances in Biodegradable Polymers and Their Applications (/journal/polymers/special_issues/F4Z3S6UM6H)**)

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Effects of NCO/OH Ratios on Bio-Based Polyurethane Film Properties Made from *Acacia mangium* Liquefied Wood (/2073-4360/15/5/1154)

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Polymers **2023**, *15*(5), 1154; https://doi.org/10.3390/polym15051154 (https://doi.org/10.3390/polym15051154) - 24 Feb 2023

Abstract The compatibility between isocyanate and polyol plays an important role in determining a polyurethane product's performance. This study aims to evaluate the effect of varying the ratios between polymeric methylene diphenyl diisocyanate (pMDI) and *Acacia mangium* liquefied wood polyol on the polyurethane film [...] Read more.
(This article belongs to the Collection Wood Composites (/journal/polymers/topical_collections/Wood_Compos_TC))

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Open Access Article (/2073-4360/15/5/1153/pdf?version=1677574167)

Solid-State Surface Patterning on Polymer Using the Microcellular Foaming Process (/2073-4360/15/5/1153)

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Polymers **2023**, *15*(5), 1153; https://doi.org/10.3390/polym15051153 (https://doi.org/10.3390/polym15051153) - 24 Feb 2023

Abstract This study proposes a novel process that integrates the molding and patterning of solid-state polymers with the force generated from the volume expansion of the microcellular-foaming process (MCP) and the softening of solid-state polymers due to gas adsorption. The batch-foaming process, which is [...] Read more.
(This article belongs to the Special Issue Polymer Surfaces and Interfaces (/journal/polymers/special_issues/Surf_Interfaces))

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Dispersion Homogeneity of Silicon Anode Slurries with Various Binders for Li-Ion Battery Anode Coating (/2073-4360/15/5/1152)

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Polymers **2023**, *15*(5), 1152; https://doi.org/10.3390/polym15051152 (https://doi.org/10.3390/polym15051152) - 24 Feb 2023

Abstract We aimed to determine the relationship between surface chemistry and the rheological properties of silicon anode slurries in lithium-ion batteries. To accomplish this, we investigated the use of various binders such as PAA, CMC/SBR, and chitosan as a means to control particle aggregation [...] Read more.

(This article belongs to the Special Issue **Rheology and Processing of Polymer Materials (/journal/polymers/special_issues/Rheology_Processing_Polymer_Materials)**)

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Open Access Article (/2073-4360/15/5/1151/pdf?version=1677832735)

Fabrication of Fibrin/Polyvinyl Alcohol Scaffolds for Skin Tissue Engineering via Emulsion Templating (/2073-4360/15/5/1151)

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Polymers **2023**, *15*(5), 1151; https://doi.org/10.3390/polym15051151 (https://doi.org/10.3390/polym15051151) - 24 Feb 2023

Abstract In the search for a novel and scalable skin scaffold for wound healing and tissue regeneration, we fabricated a class of fibrin/polyvinyl alcohol (PVA) scaffolds using an emulsion templating method. The fibrin/PVA scaffolds were formed by enzymatic coagulation of fibrinogen with thrombin in [...] Read more.

(This article belongs to the Special Issue **Processing and Structure–Property Relationships of Polymer Scaffolds for Biomedical Applications (/journal/polymers/special_issues/Processing_Structure_Property_Relationships_Polymer_Scaffolds_Biomedical_Applications)**)

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A Fluorinated Polyimide Based Nano Silver Paste with High Thermal Resistance and Outstanding Thixotropic Performance (/2073-4360/15/5/1150)

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Polymers **2023**, *15*(5), 1150; https://doi.org/10.3390/polym15051150 (https://doi.org/10.3390/polym15051150) - 24 Feb 2023

Abstract Because of high conductivity, acceptable cost and good screen-printing process performance, silver pastes have been extensively used for making flexible electronics. However, there are few reported articles focusing on high heat resistance solidified silver pastes and their rheological properties. In this paper, a [...] Read more.
(This article belongs to the Special Issue Advanced Applications of Conductive Polymer Nanocomposites (/journal/polymers/special_issues/advanced_applications_of_conductive_polymer_nanocomposites))

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The Use of Polymer Membranes for the Recovery of Copper, Zinc and Nickel from Model Solutions and Jewellery Waste (/2073-4360/15/5/1149)

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Polymers **2023**, *15*(5), 1149; https://doi.org/10.3390/polym15051149 (https://doi.org/10.3390/polym15051149) - 24 Feb 2023

Abstract A polymeric inclusion membrane (PIM) consisting of matrix CTA (cellulose triacetate), ONPPE (o-nitrophenyl pentyl ether) and phosphonium salts (Cyphos 101, Cyphos 104) was used for separation of Cu(II), Zn(II) and Ni(II) ions. Optimum conditions for metal separation were determined, i.e., the optimal concentration [...] Read more.
(This article belongs to the Special Issue Polymers for Membrane Separation: Fabrication and Applications (/journal/polymers/special_issues/5SV50831J2))

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Latest Advances in Highly Efficient Dye-Based Photoinitiating Systems for Radical Polymerization (/2073-4360/15/5/1148)

by Alicja Balcerak (https://sciprofiles.com/profile/1920886?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Janina Kabatc-Borcz (https://sciprofiles.com/profile/124111?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Zbigniew Czech (https://sciprofiles.com/profile/1270538?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Marcin Bartkowiak (https://sciprofiles.com/profile/1237481?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1148; https://doi.org/10.3390/polym15051148 (https://doi.org/10.3390/polym15051148) - 24 Feb 2023

Abstract Light-activated polymerization is one of the most important and powerful strategies for fabrication of various types of advanced polymer materials. Because of many advantages, such as economy, efficiency, energy saving and being environmentally friendly, etc., photopolymerization is commonly used in different fields of [...] Read more.

(This article belongs to the Special Issue Photosensitive Systems for Polymers Synthesis (/journal/polymers/special_issues/Photosensitive_Systems_for_Polymers_Synthesis))

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Open Access Article (/2073-4360/15/5/1147/pdf?version=1677246018)

Temperature Responsive Copolymers Films of Polyether and Bio-Based Polyamide Loaded with Imidazolium Ionic Liquids for Smart Packaging Applications (/2073-4360/15/5/1147)

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Polymers **2023**, *15*(5), 1147; https://doi.org/10.3390/polym15051147 (https://doi.org/10.3390/polym15051147) - 24 Feb 2023

Abstract Temperature-responsive materials are highly interesting for temperature-triggered applications such as drug delivery and smart packaging. Imidazolium Ionic Liquids (ILs), with a long side chain on the cation and a melting temperature of around 50 °C, were synthetized and loaded at moderate amounts (up [...] Read more.
(This article belongs to the Special Issue **Functionalized Polymeric Membranes and Thin Liquid Films: Formation, Characterization and Applications (/journal/polymers/special_issues/Funct_Polym_Membr_Thin_Liq_Film)**)

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Open Access Article (/2073-4360/15/5/1146/pdf?version=1678436519)

Efficiency of Neat and Quaternized-Cellulose Nanofibril Fillers in Chitosan Membranes for Direct Ethanol Fuel Cells (/2073-4360/15/5/1146)

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Polymers **2023**, *15*(5), 1146; https://doi.org/10.3390/polym15051146 (https://doi.org/10.3390/polym15051146) - 24 Feb 2023

Abstract In this work, fully polysaccharide based membranes were presented as self-standing, solid polyelectrolytes for application in anion exchange membrane fuel cells (AEMFCs). For this purpose, cellulose nanofibrils (CNFs) were modified successfully with an organosilane reagent, resulting in quaternized CNFs (CNF (D)), as shown [...] Read more.
(This article belongs to the Special Issue **Advanced Cellulose-Based Materials: From Nanoparticles to Complex Structures and Composites (/journal/polymers/special_issues/86DNJ5P4F1)**)

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Open Access Review (/2073-4360/15/5/1145/pdf?version=1677578459)

Self-Healing Polymer Electrolytes for Next-Generation Lithium Batteries (/2073-4360/15/5/1145)

by Anja Marinow (https://sciprofiles.com/profile/2747104?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Zviadi Katcharava (https://sciprofiles.com/profile/2771174?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Wolfgang H. Binder (https://sciprofiles.com/profile/166302?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1145; https://doi.org/10.3390/polym15051145 (https://doi.org/10.3390/polym15051145) - 24 Feb 2023

Abstract The integration of polymer materials with self-healing features into advanced lithium batteries is a promising and attractive approach to mitigate degradation and, thus, improve the performance and reliability of batteries. Polymeric materials with an ability to autonomously repair themselves after damage may compensate [...] Read more.
(This article belongs to the Special Issue Polymer Materials for Energy Storage and Conversion System (/journal/polymers/special_issues/476576J73T))

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Open Access Article (/2073-4360/15/5/1144/pdf?version=1677487349)

Sorption of CO_2, CH_4 and Their Mixtures in Amorphous Poly(2,6-dimethyl-1,4-phenylene)oxide (PPO) (/2073-4360/15/5/1144)

by Valerio Loianno (https://sciprofiles.com/profile/1538268?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Antonio Baldanza (https://sciprofiles.com/profile/2233168?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Giuseppe Scherillo (https://sciprofiles.com/profile/606540?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Pellegrino Musto (https://sciprofiles.com/profile/597255?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Giuseppe Mensitieri (https://sciprofiles.com/profile/563500?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1144; https://doi.org/10.3390/polym15051144 (https://doi.org/10.3390/polym15051144) - 24 Feb 2023

Abstract Sorption of pure CO_2 and CH_4 and CO_2/CH_4 binary gas mixtures in amorphous glassy Poly(2,6-dimethyl-1,4-phenylene) oxide (PPO) at 35 °C up to 1000 Torr was investigated. Sorption experiments were carried out using an approach that combines barometry with [...] Read more.
(This article belongs to the Special Issue Polymer Research in INSTM—National Interuniversity Consortium of Materials Science and Technology—Never Stops (/journal/polymers/special_issues/polymer_research_in_INSTM))

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Wastewater Treatment of Real Effluents by Microfiltration Using Poly(vinylidene fluoride–hexafluoropropylene) Membranes (/2073-4360/15/5/1143)

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Polymers **2023**, *15*(5), 1143; https://doi.org/10.3390/polym15051143 (https://doi.org/10.3390/polym15051143) - 24 Feb 2023

Abstract Over the last decades, the growing contamination of wastewater, mainly caused by industrial processes, improper sewage, natural calamities, and a variety of anthropogenic activities, has caused an increase in water-borne diseases. Notably, industrial applications require careful consideration as they pose significant threats to [...] Read more.

(This article belongs to the Special Issue **Polymer-Based Multifunctional Materials for Water/Wastewater Remediation (/journal/polymers/special_issues/polymer_based_multifunctional_materials_water)**)

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Open Access Article (/2073-4360/15/5/1142/pdf?version=1677245653)

Developing Post-Consumer Recycled Flexible Polypropylene and Fumed Silica-Based Nanocomposites with Improved Processability and Thermal Stability (/2073-4360/15/5/1142)

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María José Galotto (https://sciprofiles.com/profile/1104365?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1142; https://doi.org/10.3390/polym15051142 (https://doi.org/10.3390/polym15051142) - 24 Feb 2023

Abstract Collection and mechanical recycling of post-consumer flexible polypropylene packaging is limited, principally due to polypropylene being very light-weight. Moreover, service life and thermal–mechanical reprocessing degrade PP and change its thermal and rheological properties according to the structure and provenance of recycled PP. This [...] Read more.

(This article belongs to the Special Issue **Polymers for Recycling and Valorization of Soft and Hard Materials (/journal/polymers/special_issues/polymer_for_recycling)**)

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[Review of Aging Evaluation Methods for Silicone Rubber Composite Insulators (/2073-4360/15/5/1141)](/2073-4360/15/5/1141)

by Zhou Zeng (https://sciprofiles.com/profile/2784619?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Pan Guo (https://sciprofiles.com/profile/659853?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ruoshuang Zhang (https://sciprofiles.com/profile/author/L2dabUEreEMwZlFrQzNiZHgzeGRseFY0My9CdE1vWVlBN1ZHM0g0SGRWYz0=?utm_, Zhirui Zhao (https://sciprofiles.com/profile/author/aVpCMEhiZGJMV3daV3hSdW1lQXl6VlU2MGtCTnJvcG5Ta08rZ3l5WHl1az0=?utm_source=m, Jiankang Bao (https://sciprofiles.com/profile/author/YVd1WUZMbUtDbTRjS05SK3pEbEswd0VzSXNhWm8zQlRUbTFncUFseUVqTT0=?utm_sou, Qian Wang (https://sciprofiles.com/profile/author/RjcvdThYVGRSc0RqcDVWVWZtMlcvOENHWHhKYXRQb2p1V2RmSjNOTlFDND0=?utm_sour and Zheng Xu (https://sciprofiles.com/profile/640193?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1141; https://doi.org/10.3390/polym15051141 (https://doi.org/10.3390/polym15051141) - 24 Feb 2023

Abstract Silicone rubber insulation material is widely used for the external insulation of power systems. During the continuous service of a power grid, it will be seriously aged due to the influence of high voltage electric fields and harsh climate environments, which will reduce [...] Read more.

(This article belongs to the Special Issue Polymer-Based Dielectric Composites (/journal/polymers/special_issues/Poly_Die))

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Open Access Article (/2073-4360/15/5/1140/pdf?version=1677237188)

[Real-Time Monitoring of Pellet Plastication in a Full-Flight Screw and Kneading Disk Elements of a Co-Rotating Self-Wiping Twin-Screw Extruder by Acoustic Emission (AE) Sensing (/2073-4360/15/5/1140)](/2073-4360/15/5/1140)

by Tsukasa Kida (https://sciprofiles.com/profile/2560516?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Masatoshi Ohara (https://sciprofiles.com/profile/1319669?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Keigo Inamori (https://sciprofiles.com/profile/author/L3hyRGF4VlpQQ3YveEtoRFNHa0E2QnFBYUpxQXBZRjRHeWFUUWU1R2Noaz0=?utm_so, Shogo Nagasawa (https://sciprofiles.com/profile/author/R2c2WW9wTkc3cUp5NktSOXFaNm9ldStEaG1uQjRmS0xqa1M2dnBxaHlBST0=?utm_s, Shin-ichi Kihara (https://sciprofiles.com/profile/author/K0FtZUd1VnRQMnlPVWZhR3V0ZzF3ZEZBY0Q4R3BXT2Z2RWwvRHZhK0lPOD0=?utm_ and Kentaro Taki (https://sciprofiles.com/profile/427383?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1140; https://doi.org/10.3390/polym15051140 (https://doi.org/10.3390/polym15051140) - 24 Feb 2023

Abstract The plastication of pellets in a co-rotating twin-screw extruder is a significant concern for product homogeneity and stability in the plastic industry. We developed a sensing technology for pellet plastication in a plastication and melting zone in a self-wiping co-rotating twin-screw extruder. The [...] Read more.

(This article belongs to the Collection Progress in Polymer Processing and Engineering (/journal/polymers/topical_collections/Prog_Polym_Processing_Eng))

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Open Access Editorial (/2073-4360/15/5/1139/pdf?version=1677637370)

Non-Covalent Interactions in Polymers (/2073-4360/15/5/1139)

by
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Polymers **2023**, *15*(5), 1139; https://doi.org/10.3390/polym15051139 (https://doi.org/10.3390/polym15051139) - 24 Feb 2023
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Abstract Non-covalent interactions are one of the key topics in modern chemical science. These inter- and intramolecular weak interactions (e.g., hydrogen, halogen, and chalcogen bonds, stacking interactions and metallophilic contacts) have a significant effect on the properties of polymers. In this Special Issue, "Non-covalent [...] Read more.
(This article belongs to the Special Issue Non-covalent Interactions in Polymers (/journal/polymers/special_issues/41823CZ1MQ))

Open Access Article (/2073-4360/15/5/1138/pdf?version=1677228137)

Sorption Properties of PET Copolyesters and New Approach for Foaming with Filament Extrusion Additive Manufacturing (/2073-4360/15/5/1138)

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Polymers **2023**, *15*(5), 1138; https://doi.org/10.3390/polym15051138 (https://doi.org/10.3390/polym15051138) - 24 Feb 2023
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Abstract The mass transfer process of binary esters of acetic acid in polyethylene terephthalate (PET), polyethylene terephthalate with a high degree of glycol modification (PETG), and glycol-modified polycyclohexanedimethylene terephthalate (PCTG) was studied. It was found that the desorption rate of the complex ether at [...] Read more.
(This article belongs to the Special Issue Mechanical Behavior of Polymeric Materials: Recent Study (/journal/polymers/special_issues/Mechanical_Behavior_Polymers))

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Open Access Article (/2073-4360/15/5/1137/pdf?version=1677225211)

Experimental Investigation of Effect of L-Profile Hybrid Aluminium/GFRP to the Axial and Lateral Characteristic (/2073-4360/15/5/1137)

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Polymers **2023**, *15*(5), 1137; **https://doi.org/10.3390/polym15051137 (https://doi.org/10.3390/polym15051137)** - 24 Feb 2023

Abstract The current study investigates the effect of a hybrid L-profile aluminium/glass-fiber-reinforced polymer stacking sequence under axial and lateral compression loads. Four stacking sequences are studied: aluminium (A)—glass-fiber (GF)—AGF, GFA, GFAGF, and AGFA. In the axial compression test, the aluminium/GFRP hybrid tends to crush **[...] Read more.**

(This article belongs to the Special Issue **Fiber Reinforced Polymer Materials II (/journal/polymers/special_issues/33357TR1BW)**)

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Open Access Article (/2073-4360/15/5/1136/pdf?version=1677223756)

FeV LDH Coated on Sandpaper as an Electrode Material for High-Performance Flexible Energy Storage Devices (/2073-4360/15/5/1136)

by
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Polymers **2023**, *15*(5), 1136; **https://doi.org/10.3390/polym15051136 (https://doi.org/10.3390/polym15051136)** - 24 Feb 2023

Abstract Recently, considerable research efforts to achieve advanced design of promising electroactive materials as well as unique structures in supercapacitor electrodes have been explored for high-performance energy storage systems. We suggest the development of novel electroactive materials with an enlarged surface area for sandpaper **[...] Read more.**

(This article belongs to the Special Issue **Polymers for Energy and Environmental Applications (/journal/polymers/special_issues/polym_energy_environment)**)

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Highly Flexible Triboelectric Nanogenerator Using Porous Carbon Nanotube Composites (/2073-4360/15/5/1135)

by Jaehee Shin (https://sciprofiles.com/profile/1641421?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Sungho Ji (https://sciprofiles.com/profile/1786635?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Hanchul Cho (https://sciprofiles.com/profile/781297?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Jinhyoung Park (https://sciprofiles.com/profile/389885?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1135; https://doi.org/10.3390/polym15051135 (https://doi.org/10.3390/polym15051135) - 24 Feb 2023

Abstract The rapid development of portable and wearable electronic devices has led researchers to actively study triboelectric nanogenerators (TENGs) that can provide self-powering capabilities. In this study, we propose a highly flexible and stretchable sponge-type TENG, named flexible conductive sponge triboelectric nanogenerator (FCS-TENG), which [...] Read more.

(This article belongs to the Special Issue State-of-the-Art Polymer Science and Technology in Korea (2022,2023) (/journal/polymers/special_issues/EBXGX13J35))

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Open Access Article (/2073-4360/15/5/1134/pdf?version=1677221318)

Synthesis of Xanthan Gum Anchored α-Fe_2O_3 Bionanocomposite Material for Remediation of Pb (II) Contaminated Aquatic System (/2073-4360/15/5/1134)

by Fahad A. Alharthi (https://sciprofiles.com/profile/411155?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Riyadh H. Alshammari (https://sciprofiles.com/profile/2354093?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Imran Hasan (https://sciprofiles.com/profile/586973?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1134; https://doi.org/10.3390/polym15051134 (https://doi.org/10.3390/polym15051134) - 24 Feb 2023

Abstract Increases in community and industrial activities have led to disturbances of the environmental balance and the contamination of water systems through the introduction of organic and inorganic pollutants. Among the various inorganic pollutants, Pb (II) is one of the heavy metals possessing non-biodegradable [...] Read more.

(This article belongs to the Special Issue Advanced Bio-Based Polymers and Nanocomposites II (/journal/polymers/special_issues/XQZ5892P9C))

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Open Access Article (/2073-4360/15/5/1133/pdf?version=1677219585)

Solid State Polymerization of Biodegradable Poly(butylene sebacate-co-terephthalate): A Rapid, Facile Method for Property Enhancement (/2073-4360/15/5/1133)

by Daegyu Lim (https://sciprofiles.com/profile/2663834?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Su-il Park (https://sciprofiles.com/profile/450414?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1133; https://doi.org/10.3390/polym15051133 (https://doi.org/10.3390/polym15051133) - 24 Feb 2023

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Abstract Poly(butylene sebacate-co-terephthalate) (PBSeT) has generated attention as a promising biopolymer for preparing bioplastics. However, there are limited studies on the synthesis of PBSeT, impeding its commercialization. Herein, with a view to addressing this challenge, biodegradable PBSeT was modified using solid state polymerization (SSP) **[...] Read more.**

(This article belongs to the Collection **Design and Synthesis of Polymers (/journal/polymers/topical_collections/Design_Synthesis_Polymers)**)

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High-Durability Photothermal Slippery Surfaces for Droplet Manipulation Based on Ultraviolet Lithography (/2073-4360/15/5/1132)

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Polymers **2023**, *15*(5), 1132; **https://doi.org/10.3390/polym15051132 (https://doi.org/10.3390/polym15051132)** - 24 Feb 2023

Abstract Photothermal slippery surface has broad applications in many research fields for noncontacting, loss-free, and flexible droplet manipulation capability. In this work, with specific morphologic parameters and modified base materials doped by Fe_3O_4, a high-durability photothermal slippery surface (HD-PTSS) was **[...] Read more.**

(This article belongs to the Special Issue **Optics and Lasers in Polymers (/journal/polymers/special_issues/QJ0XMV61NS)**)

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Docking Design of the Different Microcapsules in Aqueous Solution and Its Quantitative On-Off Study (/2073-4360/15/5/1131)

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Polymers **2023**, *15*(5), 1131; **https://doi.org/10.3390/polym15051131 (https://doi.org/10.3390/polym15051131)** - 24 Feb 2023

Abstract To avoid risk, spacecraft docking technologies can transport batches of different astronauts or cargoes to a space station. Before now, spacecraft-docking multicarrier/multidrug delivery systems have not been reported on. Herein, inspired by spacecraft docking technology, a novel system including two different docking units, [...] Read more.
(This article belongs to the Special Issue Functional Polymers for Drug Delivery System II (/journal/polymers/special_issues/3EJ241L618))

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The Environmental Impacts of Disposable Nonwoven Fabrics during the COVID-19 Pandemic: Case Study on the Francesc de Borja Hospital (/2073-4360/15/5/1130)

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Polymers **2023**, *15*(5), 1130; https://doi.org/10.3390/polym15051130 (https://doi.org/10.3390/polym15051130) - 23 Feb 2023

Abstract Hospitals generate huge amounts of nonwoven residues daily. This paper focused on studying the evolution of nonwoven waste generated in the Francesc de Borja Hospital, Spain, over the last few years and its relation to the COVID-19 pandemic. The main objective was to [...] Read more.
(This article belongs to the Special Issue Advanced Polymers and Composites: New Functionalities and Sustainability (/journal/polymers/special_issues/2J1HDC4ZPN))

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Open Access Article (/2073-4360/15/5/1129/pdf?version=1677565978)

A Comparative Study on the Microscale and Macroscale Mechanical Properties of Dental Resin Composites (/2073-4360/15/5/1129)

by
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Zhengzhi Wang (https://sciprofiles.com/profile/330072?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1129; https://doi.org/10.3390/polym15051129 (https://doi.org/10.3390/polym15051129) - 23 Feb 2023

Abstract Dental resin composites are universal restorative materials, and various kinds of fillers are used to reinforce their mechanical properties. However, a combined study on the microscale and macroscale mechanical properties of dental resin composites is missing, and the reinforcing mechanism of the composites [...] Read more.
(This article belongs to the Special Issue Advances in Dental Resin Materials (/journal/polymers/special_issues/Adv_Dent_Resin_Mater))

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Shear Bond Strength of Resin Luting Materials to Lithium Disilicate Ceramic: Correlation between Flexural Strength and Modulus of Elasticity (/2073-4360/15/5/1128)

by Masao Irie (https://sciprofiles.com/profile/247861?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Masahiro Okada (https://sciprofiles.com/profile/author/OUs2SnEzcm5hMGFZMHJyTURkMytUaklaa0pCd29wTHREVGJ2QnZOT3lsaz0=?utm_sc ,
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Polymers **2023**, *15*(5), 1128; https://doi.org/10.3390/polym15051128 (https://doi.org/10.3390/polym15051128) - 23 Feb 2023

Abstract This study investigates the effect of the curing mode (dual-cure vs. self-cure) of resin cements (four self-adhesive and seven conventional cements) on their flexural strength and flexural modulus of elasticity, alongside their shear bond strength to lithium disilicate ceramics (LDS). The study aims [...] Read more.

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Asymmetric Monomer Design Enables Structural Control of M(Salen)-Type Polymers (/2073-4360/15/5/1127)

by Maria Novozhilova (https://sciprofiles.com/profile/2974432?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Julia Polozhentseva (https://sciprofiles.com/profile/author/QjlVeXd3eDdoNEdMTkR0Nks2c2dRNVd0M2JLdjVLSXUybzZXM1dGL0czaz0=?utm_ and
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Polymers **2023**, *15*(5), 1127; https://doi.org/10.3390/polym15051127 (https://doi.org/10.3390/polym15051127) - 23 Feb 2023

Abstract Conductive and electrochemically active polymers consisting of Salen-type metal complexes as building blocks are of interest for energy storage and conversion applications. Asymmetric monomer design is a powerful tool for fine-tuning the practical properties of conductive electrochemically active polymers but has never been [...] Read more.

(This article belongs to the Special Issue Polymer Based Electronic Devices and Sensors (/journal/polymers/special_issues/polymer_device_sensor))

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Open Access Article (/2073-4360/15/5/1126/pdf?version=1677153059)

A Shape Memory Alloy-Based Soft Actuator Mimicking an Elephant's Trunk (/2073-4360/15/5/1126)

by Minchae Kang (https://sciprofiles.com/profile/2792327?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ye-Ji Han (https://sciprofiles.com/profile/2742886?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Min-Woo Han (https://sciprofiles.com/profile/1020186?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1126; https://doi.org/10.3390/polym15051126 (https://doi.org/10.3390/polym15051126) - 23 Feb 2023

Abstract Soft actuators that execute diverse motions have recently been proposed to improve the usability of soft robots. Nature-inspired actuators, in particular, are emerging as a means of accomplishing efficient motions based on the flexibility of natural creatures. In this research, we present an [...] Read more.

(This article belongs to the Special Issue Smart and Functional Polymer Composites (/journal/polymers/special_issues/smart_function_polymer_composite))

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Open Access Article (/2073-4360/15/5/1125/pdf?version=1677149135)

Chemical Structure and Microscopic Morphology Changes of Dyed Wood Holocellulose Exposed to UV Irradiation (/2073-4360/15/5/1125)

by
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Polymers **2023**, *15*(5), 1125; https://doi.org/10.3390/polym15051125 (https://doi.org/10.3390/polym15051125) - 23 Feb 2023

Abstract Dyed wood is prone to photoaging when exposed to UV irradiation which decreases its decorative effect and service life. Holocellulose, as the main component of dyed wood, has a photodegradation behavior which is still unclear. To investigate the effect of UV irradiation on [...] Read more.
(This article belongs to the Special Issue High Proformance Wood Coating (/journal/polymers/special_issues/High_Proformance_Wood_Coating))

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Open Access Article (/2073-4360/15/5/1124/pdf?version=1677577734)

Influence of Eugenol and Its Novel Methacrylated Derivative on the Polymerization Degree of Resin-Based Composites (/2073-4360/15/5/1124)

by Ali Alrahlah (https://sciprofiles.com/profile/452817?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1124; https://doi.org/10.3390/polym15051124 (https://doi.org/10.3390/polym15051124) - 23 Feb 2023

Abstract The aim of this work was to assess the limiting rate of eugenol (Eg) and eugenyl-glycidyl methacrylate (EgGMA) at which the ideal degree of conversion (DC) of resin composites is achieved. For this, two series of experimental composites, containing, besides reinforcing silica and [...] Read more.
(This article belongs to the Special Issue Polymer Blends and Composites (/journal/polymers/special_issues/Polymer_Blends_Composites_2022))

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Polymeric Nanoparticles for Delivery of Natural Bioactive Agents: Recent Advances and Challenges (/2073-4360/15/5/1123)

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Polymers **2023**, *15*(5), 1123; https://doi.org/10.3390/polym15051123 (https://doi.org/10.3390/polym15051123) - 23 Feb 2023

Abstract In the last few decades, several natural bioactive agents have been widely utilized in the treatment and prevention of many diseases owing to their unique and versatile therapeutic effects, including antioxidant, anti-inflammatory, anticancer, and neuroprotective action. However, their poor aqueous solubility, poor bioavailability, [...] Read more.
(This article belongs to the Special Issue Research Progress of Polymer Nanomaterials for Drug Delivery (/journal/polymers/special_issues/Polym_nano_Drug_Deliv))

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Open Access Article (/2073-4360/15/5/1122/pdf?version=1678433973)

Optimization of Compression and Flexural Properties of Masonry Veneers with Recycled PET-1 (/2073-4360/15/5/1122)

by Juan Paredes (https://sciprofiles.com/profile/2688308?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1122; https://doi.org/10.3390/polym15051122 (https://doi.org/10.3390/polym15051122) - 23 Feb 2023

Abstract The study of new materials formulated using recycled polymers offers an ecological and sustainable alternative for the construction industry. In this work, we optimized the mechanical behavior of manufactured masonry veneers made from concrete reinforced with recycled polyethylene terephthalate (PET) from discarded plastic [...] Read more.
(This article belongs to the Collection Reinforced Polymer Composites (/journal/polymers/topical_collections/Reinf_Polym_Compos_TC))

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Open Access Article (/2073-4360/15/5/1121/pdf?version=1677147873)

Charge Regulation of Poly(acrylic acid) in Solutions of Non-Charged Polymer and Colloids (/2073-4360/15/5/1121)

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Polymers **2023**, *15*(5), 1121; https://doi.org/10.3390/polym15051121 (https://doi.org/10.3390/polym15051121) - 23 Feb 2023

Abstract Weak polyelectrolytes (WPEs) are responsive materials used as active charge regulators in a variety of applications, including controlled release and drug delivery in crowded bio-related and synthetic environments. In these environments, high concentrations of solvated molecules, nanostructures

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and molecular assemblies are ubiquitous. Here, [...] Read more.
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Open Access Article (/2073-4360/15/5/1120/pdf?version=1677144725)

Combined Use of Polyurethane Prepolymer and Aromatic Oil in Physicochemical Rejuvenation of Aged SBS Modified Bitumen for Performance Recovery (/2073-4360/15/5/1120)

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Polymers **2023**, *15*(5), 1120; https://doi.org/10.3390/polym15051120 (https://doi.org/10.3390/polym15051120) - 23 Feb 2023

Abstract The high-quality reutilization of waste styrene–butadiene–styrene copolymer (SBS) modified asphalt mixtures is a difficult issue in the field of highways today, and the main reason is that conventional rejuvenation technology fails to achieve the effective rejuvenation of aged SBS in binder, causing significant [...] Read more.
(This article belongs to the Special Issue Recycling and Resource Recovery of Polymeric Materials (/journal/polymers/special_issues/Z1863J72OK))

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Extensional Rheology of Poly(vinylidene fluoride)/N,N-dimethylformamide Solutions (/2073-4360/15/5/1119)

by
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Polymers **2023**, *15*(5), 1119; https://doi.org/10.3390/polym15051119 (https://doi.org/10.3390/polym15051119) - 23 Feb 2023

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Abstract Typical extension flow occurs in electrospinning process of Poly(vinylidene fluoride) (PVDF) solutions such that researchers focus on extensional rheological behaviors of PVDF solutions. The extensional viscosity of PVDF solutions is measured to know the fluidic deformation in extension flows. The solutions are prepared **[...] Read more.**
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Free Vibration Characteristics of CFRP Laminate with One-Dimensional Periodic Structures (/2073-4360/15/5/1118)

by **Yukuan Dou (https://sciprofiles.com/profile/2598372?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1118; **https://doi.org/10.3390/polym15051118 (https://doi.org/10.3390/polym15051118)** - 23 Feb 2023

Abstract This paper proposes an approach of stacking prepreg periodically for carbon fiber-reinforced polymer composites (CFRP) laminate. This paper will discuss the natural frequency, modal damping, and vibration characteristics of CFRP laminate with one-dimensional periodic structures. The damping ratio of CFRP laminate is calculated **[...] Read more.**
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Study on Flocculation Behavior of Cr(VI) Using a Novel Chitosan Functionalized with Thiol Groups (/2073-4360/15/5/1117)

by **Yuelong Zhao (https://sciprofiles.com/profile/2936618?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)**,
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Polymers **2023**, *15*(5), 1117; **https://doi.org/10.3390/polym15051117 (https://doi.org/10.3390/polym15051117)** - 23 Feb 2023

Abstract In this study, CTS-GSH was prepared by grafting thiol (–SH) groups onto chitosan (CTS), which was characterized through Fourier Transform Infrared (FT-IR) spectra, Scanning Electron Microscopy (SEM) and Differential Thermal Analysis–Thermogravimetric Analysis (DTA-TG). The performance of CTS-GSH was evaluated by measuring Cr(VI) removal **[...] Read more.**
(This article belongs to the Special Issue **Polymeric Materials for Water/Wastewater Treatment Applications (/journal/polymers/special_issues/Poly_Water_Treat_App)**)

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Sulfation of Birch Wood Microcrystalline Cellulose with Sulfamic Acid Using Ion-Exchange Resins as Catalysts (/2073-4360/15/5/1116)

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Polymers **2023**, *15*(5), 1116; https://doi.org/10.3390/polym15051116 (https://doi.org/10.3390/polym15051116) - 23 Feb 2023

Abstract Cellulose sulfates are important biologically active substances with a wide range of useful properties. The development of new methods for the production of cellulose sulfates is an urgent task. In this work, we investigated ion-exchange resins as catalysts for the sulfation of cellulose [...] Read more.
(This article belongs to the Special Issue **Sustainable Natural Polymers from Biomass (/journal/polymers/special_issues/Sustainable_Natural_Polymers_Biomass)**)

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Sustainable and Green Production of Nanostructured Cellulose by a 2-Step Mechano-Enzymatic Process (/2073-4360/15/5/1115)

by Martina Aulitto (https://sciprofiles.com/profile/1356279?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1115; https://doi.org/10.3390/polym15051115 (https://doi.org/10.3390/polym15051115) - 23 Feb 2023 Back to TopTop

Abstract Nanostructured cellulose (NC) represents an emerging sustainable biomaterial for diverse biotechnological applications; however, its production requires hazardous chemicals that render the process ecologically unfriendly. Using commercial plant-derived cellulose, an innovative strategy for NC production based on the combination of mechanical and enzymatic approaches **[...] Read more.**
(This article belongs to the Special Issue **Chemical and Mechano-Chemical Modification of Polymers and Organic Materials (/journal/polymers/special_issues/mechanochemical_treat_polym_organic_mater)**)

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Poly(methyl methacrylate) as Healing Agent for Carbon Fibre Reinforced Epoxy Composites (/2073-4360/15/5/1114)

by
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Polymers **2023**, *15*(5), 1114; **https://doi.org/10.3390/polym15051114 (https://doi.org/10.3390/polym15051114)** - 23 Feb 2023

Abstract Self-healing materials offer a potential solution to the problem of damage to fibre-reinforced plastics (FRPs) by allowing for the in-service repair of composite materials at a lower cost, in less time, and with improved mechanical properties compared to traditional repair methods. This study **[...] Read more.**
(This article belongs to the Collection **Progress in Polymer Composites and Nanocomposites (/journal/polymers/topical_collections/progress_in_polymer_composites_and_nanocomposites)**)

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Open Access Article **(/2073-4360/15/5/1113/pdf?version=1677139164)**

The Influence of Printing Layer Thickness and Orientation on the Mechanical Properties of DLP 3D-Printed Dental Resin (/2073-4360/15/5/1113)

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Polymers **2023**, *15*(5), 1113; **https://doi.org/10.3390/polym15051113 (https://doi.org/10.3390/polym15051113)** - 23 Feb 2023

Abstract Technological advances are closely related to the development of new materials and their processing and manufacturing technologies. In the dental field, the high complexity of the geometrical designs of crowns, bridges and other applications of digital light processing 3D-printable biocompatible resins is the **[...] Read more.**
(This article belongs to the Special Issue **Physical, Chemical, and Mechanical Properties of Different Polymers in Dentistry and Correlated Areas (/journal/polymers/special_issues/12JY6CB384)**)

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Synthesis of Fluorescent, Small, Stable and Non-Toxic Epitope-Imprinted Polymer Nanoparticles in Water (/2073-4360/15/5/1112)

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Polymers **2023**, *15*(5), 1112; https://doi.org/10.3390/polym15051112 (https://doi.org/10.3390/polym15051112) - 23 Feb 2023

Abstract Molecularly imprinted polymers (MIPs) are really interesting for nanomedicine. To be suitable for such application, they need to be small, stable in aqueous media and sometimes fluorescent for bioimaging. We report herein, the facile synthesis of fluorescent, small (below 200 nm), water-soluble and [...] Read more.
(This article belongs to the Special Issue Molecularly Imprinted Polymers: Design, Characterization and Application (/journal/polymers/special_issues/D761113S3S))

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Open Access Article (/2073-4360/15/5/1111/pdf?version=1678177305)

Polymeric Solar Cell with 19.69% Efficiency Based on Poly(o-phenylene diamine)/TiO_2 Composites (/2073-4360/15/5/1111)

by M. Sh. Zoromba (https://sciprofiles.com/profile/1388342?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1111; https://doi.org/10.3390/polym15051111 (https://doi.org/10.3390/polym15051111) - 23 Feb 2023

Abstract Conducting poly orthophenylene diamine polymer (PoPDA) was synthesized via the oxidative polymerization route. A poly(o-phenylene diamine) (PoPDA)/titanium dioxide nanoparticle mono nanocomposite [PoPDA/TiO_2]^{MNC} was synthesized using the sol–gel method. The physical vapor deposition (PVD) technique was successfully used to deposit the [...] Read more.
(This article belongs to the Section Circular and Green Polymer Science (/journal/polymers/sections/Circ_Green))

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Open Access Article (/2073-4360/15/5/1110/pdf?version=1677137545)

Numerical Investigation into GFRP Composite Pipes under Hydrostatic Internal Pressure (/2073-4360/15/5/1110)

by Tamer Ali Sebeay (https://sciprofiles.com/profile/975699?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Azzam Ahmed (https://sciprofiles.com/profile/2238310?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1110; https://doi.org/10.3390/polym15051110 (https://doi.org/10.3390/polym15051110) - 23 Feb 2023

Abstract Glass-fiber-reinforced plastic (GFRP) composite pipes are used extensively in high-performance applications, due to their high stiffness and strength, corrosion resistance, and thermal and chemical stability. In piping, composites showed high performance due to their long service life. In this study, glass-fiber-reinforced plastic composite [...] Read more.
(This article belongs to the Special Issue Recent Advancement in Fibre Reinforced Polymer Reinforcing Bars and Pultruded Sections (/journal/polymers/special_issues/LL2404Y8N9))

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Deposition of Chitosan on Plasma-Treated Polymers—A Review (/2073-4360/15/5/1109)

by Alenka Vesel (https://sciprofiles.com/profile/54818?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1109; https://doi.org/10.3390/polym15051109 (https://doi.org/10.3390/polym15051109) - 23 Feb 2023

Abstract Materials for biomedical applications often need to be coated to enhance their performance, such as their biocompatibility, antibacterial, antioxidant, and anti-inflammatory properties, or to assist the regeneration process and influence cell adhesion. Among naturally available substances, chitosan meets the above criteria. Most synthetic [...] Read more.
(This article belongs to the Special Issue Polymer Materials Based on Chitosan, Cellulose and Their Derivates (/journal/polymers/special_issues/polymer_materials_based_on_chitosan_and_biodegradable_polymers))

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Multiphase Flow Production Enhancement Using Drag Reducing Polymers (/2073-4360/15/5/1108)

by
Abdelsalam Alsarkhi (https://sciprofiles.com/profile/904845?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
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Mustafa Salah (https://sciprofiles.com/profile/author/R1YxK3UzK0h4WTRWY0JmTG01Z2Y2OWg3RGprT05xN0ZJWElNcXJkK0YzST0=?utm_so

Polymers **2023**, *15*(5), 1108; https://doi.org/10.3390/polym15051108 (https://doi.org/10.3390/polym15051108) - 23 Feb 2023

Abstract This paper presents a comprehensive experimental investigation concerning the effect of drag reducing polymers (DRP) on enhancing the throughput and reducing the pressure drop for a horizontal pipe carrying two-phase flow of air and water mixture. Moreover, the ability of these polymer entanglements [...] Read more.
(This article belongs to the Special Issue Polymers Physics: From Theory to Experimental Applications (/journal/polymers/special_issues/4763X2G2Z6))

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Open Access Article (/2073-4360/15/5/1107/pdf?version=1677145070)

Comparison of Solidification Characteristics between Polymer-Cured and Bio-Cured Fly Ash in the Laboratory (/2073-4360/15/5/1107)

by Yinggang Jia (https://sciprofiles.com/profile/2630450?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Yuhan Liu (https://sciprofiles.com/profile/2785335?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Jian Chen (https://sciprofiles.com/profile/2633395?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1107; https://doi.org/10.3390/polym15051107 (https://doi.org/10.3390/polym15051107) - 23 Feb 2023

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Abstract Fly ash (FA) usually causes air and soil pollution due to wind erosion. However, most FA field surface stabilization technologies have long construction periods, poor curing effects, and secondary pollution. Therefore, there is an urgent need to develop an efficient and environmentally friendly [...] Read more.
(This article belongs to the Section Polymer Applications (/journal/polymers/sections/Polymer_Applications))

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Open Access Article (/2073-4360/15/5/1106/pdf?version=1677138804)

Understanding the Effect of Side Reactions on the Recyclability of Furan–Maleimide Resins Based on Thermoreversible Diels–Alder Network (/2073-4360/15/5/1106)

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Polymers **2023**, *15*(5), 1106; https://doi.org/10.3390/polym15051106 (https://doi.org/10.3390/polym15051106) - 23 Feb 2023

Abstract We studied the effect of side reactions on the reversibility of epoxy with thermoreversible Diels–Alder (DA) cycloadducts based on furan and maleimide chemistry. The most common side reaction is the maleimide homopolymerization which introduces irreversible crosslinking in the network adversely affecting the recyclability. [...] Read more.
(This article belongs to the Special Issue Advanced Recycling of Plastic Waste: An Approach for Circular Economy (/journal/polymers/special_issues/Adv_Recycl_Plast_Waste))

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Open Access Review (/2073-4360/15/5/1105/pdf?version=1677649288)

The Polymers of Diethynylarenes—Is Selective Polymerization at One Acetylene Bond Possible? A Review (/2073-4360/15/5/1105)

by
Vyacheslav M. Misin (https://sciprofiles.com/profile/author/bkxPRndWZ3kvOHg4TFlJTklhbmR2eFltdXlyY1BCTzFULzdCYjdUN1Z6MD0=?utm_s
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Mark E. Kazakov (https://sciprofiles.com/profile/author/ZTY1Y3hMbk1pVmhibndCRkdlTTNSeG1kWUNxS2pwTEpETjJydWVzNUdpMD0=?utm_s
and
Vladimir A. Volkov (https://sciprofiles.com/profile/2909535?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1105; **https://doi.org/10.3390/polym15051105 (https://doi.org/10.3390/polym15051105)** - 22 Feb 2023

Abstract In this review, all available publications on the polymerization of all isomers of bifunctional diethynylarenes due to the opening of C≡C bonds were considered and analyzed. It has been shown that with the use of polymers of diethynylbenzene, heat-resistant and ablative materials, catalysts, **[...] Read more.**
(This article belongs to the Special Issue **Application and Development of Conductive Polymers (/journal/polymers/special_issues/I2C820DAQ3)**)

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Cytoprotection of Probiotic *Lactobacillus acidophilus* with Artificial Nanoshells of Nature-Derived Eggshell Membrane Hydrolysates and Coffee Melanoidins in Single-Cell Nanoencapsulation (/2073-4360/15/5/1104)

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Polymers **2023**, *15*(5), 1104; https://doi.org/10.3390/polym15051104 (https://doi.org/10.3390/polym15051104) - 22 Feb 2023

Abstract One-step fabrication method for thin films and shells is developed with nature-derived eggshell membrane hydrolysates (ESMHs) and coffee melanoidins (CMs) that have been discarded as food waste. The nature-derived polymeric materials, ESMHs and CMs, prove highly biocompatible with living cells, and the one-step [...] Read more.
(This article belongs to the Special Issue **Biopolymers: Biocompatible and Biodegradable Platforms for Fabrication of Nanoscale Materials and Building Blocks (/journal/polymers/special_issues/biocompat_biodegrad_nano_mater)**)

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Cellulosic Ethanol Production from Weed Biomass Hydrolysate of *Vietnamosasa pusilla* (/2073-4360/15/5/1103)

by
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Polymers **2023**, *15*(5), 1103; https://doi.org/10.3390/polym15051103 (https://doi.org/10.3390/polym15051103) - 22 Feb 2023

Abstract Lignocellulosic biomass can be used as a renewable and sustainable energy source to help reduce the consequences of global warming. In the new energy age, the bioconversion of lignocellulosic biomass into green and clean energy displays remarkable potential and makes efficient use of [...] Read more.
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Damping Properties of Large-Scale Overlap Joints Bonded with Epoxy Hybrid Resin or Polyurethanes: Experimental Characterisation and Analytical Description (/2073-4360/15/5/1102)

by Jannis Damm (https://sciprofiles.com/profile/2762726?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Matthias Albiez (https://sciprofiles.com/profile/1000895?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1102; https://doi.org/10.3390/polym15051102 (https://doi.org/10.3390/polym15051102) - 22 Feb 2023

Abstract Structures in various industries are exposed to dynamic loads. The dissipative properties of adhesively bonded joints can contribute to the damping of dynamically stressed structures. Dynamic hysteresis tests are carried out to determine the damping properties of adhesively bonded overlap
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joints by varying [...] Read more.
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Preparation of a Polyaniline-Modified Hybrid Graphene Aerogel-Like Nanocomposite for Efficient Adsorption of Heavy Metal Ions from Aquatic Media (/2073-4360/15/5/1101)

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Polymers **2023**, *15*(5), 1101; https://doi.org/10.3390/polym15051101 (https://doi.org/10.3390/polym15051101) - 22 Feb 2023

Abstract This paper considers the synthesis of a novel nanocomposite based on reduced graphene oxide and oxidized carbon nanotubes modified with polyaniline and phenol-formaldehyde resin and developed through the carbonization of a pristine aerogel. It was tested as an efficient adsorbent to purify aquatic [...] Read more.
(This article belongs to the Special Issue Carbon/Polymer Composite Materials (/journal/polymers/special_issues/JG23F6BA2P))

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Protective Properties of Copper-Loaded Chitosan Nanoparticles against Soybean Pathogens *Pseudomonas savastanoi* pv. *glycinea* and *Curtobacterium flaccumfaciens* pv. *flaccumfaciens* (/2073-4360/15/5/1100)

by Rashit Tarakanov (https://sciprofiles.com/profile/1953761?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Balzhima Shagdarova (https://sciprofiles.com/profile/1932807?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Tatiana Lyalina (https://sciprofiles.com/profile/2666942?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Yuliya Zhuikova (https://sciprofiles.com/profile/2526465?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Alla Il'ina (https://sciprofiles.com/profile/2737343?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Fevzi Dzhalilov (https://sciprofiles.com/profile/2410116?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Valery Varlamov (https://sciprofiles.com/profile/1932929?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1100; https://doi.org/10.3390/polym15051100 (https://doi.org/10.3390/polym15051100) - 22 Feb 2023

Abstract Soybeans are a valuable food product, containing 40% protein and a large percentage of unsaturated fatty acids ranging from 17 to 23%. *Pseudomonas savastanoi* pv. *glycinea* (Psg) and *Curtobacterium flaccumfaciens* pv. *flaccumfaciens* (Cff) are harmful bacterial pathogens of soybean. The bacterial resistance of [...] Read more.
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Chitosan-Decorated Copper Oxide Nanocomposite: Investigation of Its Antifungal Activity against Tomato Gray Mold Caused by *Botrytis cinerea* (/2073-4360/15/5/1099)

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Polymers **2023**, *15*(5), 1099; https://doi.org/10.3390/polym15051099 (https://doi.org/10.3390/polym15051099) - 22 Feb 2023

Abstract Owing to the remarkable antimicrobial potential of these materials, research into the possible use of nanomaterials as alternatives to fungicides in sustainable agriculture is increasingly progressing. Here, we investigated the potential antifungal properties of chitosan-decorated copper oxide nanocomposite (CH@CuO NPs) to control gray [...] Read more.
(This article belongs to the Special Issue Properties and Characterization of Polymers in Nanomaterials (/journal/polymers/special_issues/properties_characterization_polymers_nanomaterials))

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Theoretical–Experimental Study of the Action of Trace Amounts of Formaldehyde, Propionaldehyde, and Butyraldehyde as Inhibitors of the Ziegler–Natta Catalyst and the Synthesis of an Ethylene–Propylene Copolymer (/2073-4360/15/5/1098)

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Polymers **2023**, *15*(5), 1098; https://doi.org/10.3390/polym15051098 (https://doi.org/10.3390/polym15051098) - 22 Feb 2023

Abstract The copolymer synthesis process can be affected by failures in the production process or by contaminating compounds such as ketones, thiols, and gases, among others. These impurities act as an inhibiting agent of the Ziegler–Natta (ZN) catalyst affecting its productivity and disturbing the [...] Read more.
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Open Access Article (/2073-4360/15/5/1097/pdf?version=1677418011)

Physicochemical Properties of UV-Irradiated, Biaxially Oriented PLA Tubular Scaffolds (/2073-4360/15/5/1097)

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Polymers **2023**, *15*(5), 1097; https://doi.org/10.3390/polym15051097 (https://doi.org/10.3390/polym15051097) - 22 Feb 2023

Abstract PLA and its blends are the most extensively used materials for various biomedical applications such as scaffolds, implants, and other medical devices. The most extensively used method for tubular scaffold fabrication is by using the extrusion process. However, PLA scaffolds show limitations such [...] Read more.
(This article belongs to the Topic Surface Engineered Materials (/topics/surface_engineered_materials))

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Open Access Article (/2073-4360/15/5/1096/pdf?version=1677752258)

Comparative Evaluation of the Stiffness of Abaca-Fiber-Reinforced Bio-Polyethylene and High Density Polyethylene Composites (/2073-4360/15/5/1096)

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Polymers **2023**, *15*(5), 1096; https://doi.org/10.3390/polym15051096 (https://doi.org/10.3390/polym15051096) - 22 Feb 2023

Back to TopTop

Abstract The use of bio-based matrices together with natural fibers as reinforcement is a strategy for obtaining materials with competitive mechanical properties, costs, and environmental impacts. However, bio-based matrices, unknown by the industry, can be a market entry barrier. The use of bio-polyethylene, which [...] Read more.
(This article belongs to the Special Issue Polymer Composite Analysis and Characterization II (/journal/polymers/special_issues/1MQ7DF7AYU))

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Open Access Article (/2073-4360/15/5/1095/pdf?version=1677065356)

Conjugated Microporous Polymers Based on Ferrocene Units as Highly Efficient Electrodes for Energy Storage (/2073-4360/15/5/1095)

by
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Polymers **2023**, *15*(5), 1095; https://doi.org/10.3390/polym15051095 (https://doi.org/10.3390/polym15051095) - 22 Feb 2023

Abstract This work describes the facile designing of three conjugated microporous polymers incorporated based on the ferrocene (FC) unit with 1,4-bis(4,6-diamino-s-triazin-2-yl)benzene (PDAT), tris(4-aminophenyl)amine (TPA-NH_2), and tetrakis(4-aminophenyl)ethane (TPE-NH_2) to form PDAT-FC, TPA-FC, and TPE-FC CMPs from Schiff base reaction of 1,1′-diacetylferrocene [...] Read more.
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Open Access Article (/2073-4360/15/5/1094/pdf?version=1678257764)

Thiophene End-Functionalized Oligo-(D,L-Lactide) as a New Electroactive Macromonomer for the "Hairy-Rod" Type Conjugated Polymers Synthesis (/2073-4360/15/5/1094)

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Polymers **2023**, *15*(5), 1094; https://doi.org/10.3390/polym15051094 (https://doi.org/10.3390/polym15051094) - 22 Feb 2023

Abstract The development of the modern society imposes a fast-growing demand for new advanced functional polymer materials. To this aim, one of the most plausible current methodologies is the end-group functionalization of existing conventional polymers. If the end functional group is able to polymerize, [...] Read more.
(This article belongs to the Special Issue Polyester-Based Materials II (/journal/polymers/special_issues/5KC50B090P))

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Open Access Article (/2073-4360/15/5/1093/pdf?version=1677132992)

Bio-Based Phosphate-Containing Polyester for Improvement of Fire Reaction in Wooden Particleboard (/2073-4360/15/5/1093)

by Ingemar Svensson (https://sciprofiles.com/profile/2739432?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Amaia Butron (https://sciprofiles.com/profile/1650881?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Maddalen Puyadena (https://sciprofiles.com/profile/2739433?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Alba González (https://sciprofiles.com/profile/2739434?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Lourdes Irusta (https://sciprofiles.com/profile/2739435?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Aitor Barrio (https://sciprofiles.com/profile/1224990?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1093; https://doi.org/10.3390/polym15051093 (https://doi.org/10.3390/polym15051093) - 22 Feb 2023

Abstract A new phosphate-containing bio-polyester based on glycerol and citric acid was synthesized and evaluated as fire-retardant (FR) in wooden particleboards. Phosphorus pentoxide was used to first introduce phosphate esters in the glycerol followed by esterification with citric acid to produce the bio-polyester. The [...] Read more.

(This article belongs to the Special Issue Flame-Retardant Polymer Composites (/journal/polymers/special_issues/Flame_Retard_Polym_Compos))

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Open Access Article (/2073-4360/15/5/1092/pdf?version=1677167540)

Low-Velocity Impact Resistance of 3D Re-Entrant Honeycomb Sandwich Structures with CFRP Face Sheets (/2073-4360/15/5/1092)

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Polymers **2023**, *15*(5), 1092; https://doi.org/10.3390/polym15051092 (https://doi.org/10.3390/polym15051092) - 22 Feb 2023

Abstract Lightweight sandwich structures have been receiving significant attention. By studying and imitating the structure of biomaterials, its application in the design of sandwich structures has also been found to be feasible. With inspiration from the arrangement of fish scales, a 3D re-entrant honeycomb [...] Read more.

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Open Access Article **(/2073-4360/15/5/1091/pdf?version=1677057908)**

Introducing Semi-Interpenetrating Networks of Chitosan and Ammonium-Quaternary Polymers for the Effective Removal of Waterborne Pathogens from Wastewaters (/2073-4360/15/5/1091)

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Polymers **2023**, *15*(5), 1091; **https://doi.org/10.3390/polym15051091 (https://doi.org/10.3390/polym15051091)** - 22 Feb 2023

Abstract The present work aims to study the influence of ammonium-quaternary monomers and chitosan, obtained from different sources, upon the effect of semi-interpenetrating polymer network (semi-IPN) hydrogels upon the removal of waterborne pathogens and bacteria from wastewater. To this end, the study was focused **[...] Read more.**
(This article belongs to the Special Issue **Polymer Composites for Advanced Water Treatment Applications (/journal/polymers/special_issues/poly_compo_water_treatment)**)

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Open Access Article **(/2073-4360/15/5/1090/pdf?version=1677055980)**

Turmeric Herb Extract-Incorporated Biopolymer Dressings with Beneficial Antibacterial, Antioxidant and Anti-Inflammatory Properties for Wound Healing (/2073-4360/15/5/1090)

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Polymers **2023**, *15*(5), 1090; **https://doi.org/10.3390/polym15051090 (https://doi.org/10.3390/polym15051090)** - 22 Feb 2023

Abstract Bacterial infection and inflammation caused by excess oxidative stress are serious challenges in chronic wound healing. The aim of this work is to investigate a wound dressing based on natural- and biowaste-derived biopolymers loaded with an herb extract that demonstrates antibacterial, antioxidant, and **[...] Read more.**

(This article belongs to the Section **Biomacromolecules, Biobased and Biodegradable Polymers (/journal/polymers/sections/Biomacromol_Biobased_Biodegradable_Polymers)**)

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Open Access Article **(/2073-4360/15/5/1089/pdf?version=1677053715)**

Vibration Isolation Properties of Novel Spacer Fabric with Silicone Inlay (/2073-4360/15/5/1089)

by Annie Yu (https://sciprofiles.com/profile/1848443?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1089; **https://doi.org/10.3390/polym15051089 (https://doi.org/10.3390/polym15051089)** - 22 Feb 2023

Abstract Spacer fabrics are good for impact force absorption and have the potential for vibration isolation. Inlay knitting of additional material to the spacer fabrics can give reinforcement to the structure. This study aims to investigate the vibration isolation properties of three-layer sandwich fabrics **[...] Read more.**

(This article belongs to the Special Issue **Advanced Textile Based Polymer Composites: Synthesis, Characterization and Applications II (/journal/polymers/special_issues/LIY0RLJWK5)**)

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Synthesis of Furan-Based Diamine and Its Application in the Preparation of Bio-Based Polyimide (/2073-4360/15/5/1088)

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Polymers **2023**, *15*(5), 1088; https://doi.org/10.3390/polym15051088 (https://doi.org/10.3390/polym15051088) - 22 Feb 2023

Abstract Furan-based compounds are a new class of compounds characteristic of wide abundance, feasible availability, and environmental friendliness. Presently, polyimide (PI) is the best membrane insulation material in the world, which is widely used in the fields of national defense, liquid crystals, lasers, and **[...] Read more.**
(This article belongs to the Special Issue **Eco-Friendly Polymers and Polymer Composites (/journal/polymers/special_issues/Eco_Fri_Poly)**)

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Open Access Review (/2073-4360/15/5/1087/pdf?version=1677467342)

Geopolymer Materials for Bone Tissue Applications: Recent Advances and Future Perspectives (/2073-4360/15/5/1087)

by Laura Ricciotti (https://sciprofiles.com/profile/52957?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1087; https://doi.org/10.3390/polym15051087 (https://doi.org/10.3390/polym15051087) - 22 Feb 2023

Abstract With progress in the bone tissue engineering (BTE) field, there is an important need to develop innovative biomaterials to improve the bone healing process using reproducible, affordable, and low-environmental-impact alternative synthetic strategies. This review thoroughly examines geopolymers' state-of-the-art and current applications and their **[...] Read more.**
(This article belongs to the Special Issue **Geopolymers: Recent Research and Future Prospect (/journal/polymers/special_issues/6E0PBYCNR3)**)

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Open Access Article (/2073-4360/15/5/1086/pdf?version=1677209870)

Novel and Facile Colorimetric Detection of Reducing Sugars in Foods via In Situ Formed Gelatin-Capped Silver Nanoparticles (/2073-4360/15/5/1086)

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Polymers **2023**, *15*(5), 1086; https://doi.org/10.3390/polym15051086 (https://doi.org/10.3390/polym15051086) - 21 Feb 2023

Abstract The evolution of green technology for the simple and ecological formation of silver nanoparticles (AgNPs) inspired the present work for simple and efficient detection of reducing sugars (RS) in foods. The proposed method relies on gelatin as the capping and stabilizing agent and [...] Read more.
(This article belongs to the Special Issue **Advances in Natural Polymers: Extraction Methods and Applications (/journal/polymers/special_issues/natural_polym)**)

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Sustainable Engineered Design and Scalable Manufacturing of Upcycled Graphene Reinforced Polylactic Acid/Polyurethane Blend Composites Having Shape Memory Behavior (/2073-4360/15/5/1085)

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Polymers **2023**, *15*(5), 1085; https://doi.org/10.3390/polym15051085 (https://doi.org/10.3390/polym15051085) - 21 Feb 2023

Abstract Material design in shape memory polymers (SMPs) carries significant importance in attaining high performance and adjusting the interface between additive and host polymer matrix to increase the degree of recovery. Herein, the main challenge is to enhance the interfacial interactions to provide reversibility [...] Read more.
(This article belongs to the Special Issue **Durability and Degradation of Polymeric Materials II (/journal/polymers/special_issues/R4F308B44N)**)

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Investigation of the Mechanical Properties of Quick-Strength Geopolymer Material Considering Preheated-to-Room Temperature Ratio of Sand, Na_2SiO_3-to-NaOH Ratio, and Fly Ash-to-GGBS Ratio (/2073-4360/15/5/1084)

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Polymers **2023**, *15*(5), 1084; https://doi.org/10.3390/polym15051084 (https://doi.org/10.3390/polym15051084) - 21 Feb 2023

Abstract Geopolymer concrete is a useful alternative construction material for bridge deck systems, as it is characterized by a low carbon footprint, rapid setting, quick strength development, low cost, freeze-thaw resistance, low shrinkage, and sulphate and corrosion resistance. Heat curing enhances the mechanical properties [...] Read more.

(This article belongs to the Special Issue **Development of Inorganic Polymers and Geopolymers (/journal/polymers/special_issues/inorganic_poly_geopoly)**)

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Open Access Article (/2073-4360/15/5/1083/pdf?version=1677237383)

Electrospun NiPd Nanoparticles Supported on Polymer Membrane Nanofibers as an Efficient Catalyst for $NaBH_4$ Dehydrogenation (/2073-4360/15/5/1083)

by Nasser Zouli (https://sciprofiles.com/profile/2791084?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1083; https://doi.org/10.3390/polym15051083 (https://doi.org/10.3390/polym15051083) - 21 Feb 2023

Abstract Sodium borohydride (SBH) hydrolysis in the presence of cheap and efficient catalysts has been proposed as a safe and efficient method for generating clean hydrogen energy for use in portable applications. In this work, we synthesized bimetallic NiPd nanoparticles (NPs) supported on poly(vinylidene [...] Read more.
(This article belongs to the Special Issue State-of-the-Art Polymer Science and Technology in Saudi Arabia (2021,2022) (/journal/polymers/special_issues/KSA_2021_2022))

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Open Access Review (/2073-4360/15/5/1082/pdf?version=1677208513)

Polymeric Scaffolds Used in Dental Pulp Regeneration by Tissue Engineering Approach (/2073-4360/15/5/1082)

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Polymers **2023**, *15*(5), 1082; https://doi.org/10.3390/polym15051082 (https://doi.org/10.3390/polym15051082) - 21 Feb 2023

Abstract Currently, the challenge in dentistry is to revitalize dental pulp by utilizing tissue engineering technology; thus, a biomaterial is needed to facilitate the process. One of the three essential elements in tissue engineering technology is a scaffold. A scaffold acts as a three-dimensional [...] Read more.
(This article belongs to the Special Issue Sustainable Biopolymer-Based Composites: Processing, Characterization, and Application (/journal/polymers/special_issues/4P2ZXQ04IP))

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Open Access Editor's Choice Article (/2073-4360/15/5/1081/pdf?version=1677138748)

Feasibility of Valorization of Post-Consumer Recycled Flexible Polypropylene by Adding Fumed Nanosilica for Its Potential Use in Food Packaging toward Sustainability (/2073-4360/15/5/1081)

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Polymers **2023**, *15*(5), 1081; https://doi.org/10.3390/polym15051081 (https://doi.org/10.3390/polym15051081) - 21 Feb 2023

Abstract The food industry has a current challenge of increasing the recycling of post-consumer plastics to reduce plastic waste towards a circular economy, especially flexible polypropylene, which is highly demanded in food packaging. However, recycling post-consumer plastics is limited because service life and reprocessing [...] Read more.
(This article belongs to the Special Issue Polymers for Recycling and Valorization of Soft and Hard Materials (/journal/polymers/special_issues/polymer_for_recycling))

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Optimization of 3D Cooling Channels in Plastic Injection Molds by Taguchi-Integrated Principal Component Analysis (PCA) (/2073-4360/15/5/1080)

by Pham Son Minh (https://sciprofiles.com/profile/463066?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Hung-Son Dang (https://sciprofiles.com/profile/author/RytCZTBYMGk4T0k2U0dMU04vd2dFWlNQd1lKbGJjMEtrV1p3b1NienFwZz0=?utm_sour and Nguyen Canh Ha (https://sciprofiles.com/profile/2779893?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1080; https://doi.org/10.3390/polym15051080 (https://doi.org/10.3390/polym15051080) - 21 Feb 2023

Abstract Injection molding has become an increasingly widely used method in the production of plastic parts. The injection process can be separated into five steps: mold closure, filling, packing, cooling, and product ejection. Before the melted plastic is loaded into the mold, the mold [...] Read more.

(This article belongs to the Special Issue Advanced Polymeric Materials in Injection Molding (/journal/polymers/special_issues/polym_mater_inject_mold))

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Effect of Electrospun PLGA/Collagen Scaffolds on Cell Adhesion, Viability, and Collagen Release: Potential Applications in Tissue Engineering (/2073-4360/15/5/1079)

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Polymers **2023**, *15*(5), 1079; https://doi.org/10.3390/polym15051079 (https://doi.org/10.3390/polym15051079) - 21 Feb 2023

Abstract The development of scaffolding obtained by electrospinning is widely used in tissue engineering due to porous and fibrous structures that can mimic the extracellular matrix. In this study, poly (lactic-co-glycolic acid) (PLGA)/collagen fibers were fabricated by electrospinning method and then evaluated in the [...] Read more.

(This article belongs to the Special Issue Polymeric Materials for Regenerative Medicine and Advanced Structures (/journal/polymers/special_issues/polymeric_materials_regenerative_medicine_advanced_structures))

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Effect of Short Fibers on Fracture Properties of Epoxy-Based Polymer Concrete Exposed to High Temperatures (/2073-4360/15/5/1078)

by Oussama Elalaoui (https://sciprofiles.com/profile/1975612?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1078; https://doi.org/10.3390/polym15051078 (https://doi.org/10.3390/polym15051078) - 21 Feb 2023

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Abstract Recently, polymer concrete (PC) has been widely used in many civil engineering applications. PC shows superiority in major physical, mechanical, and fracture properties comparing to ordinary Portland cement concrete. Despite many suitable characteristics of thermosetting resins related to processing, the thermal resistance of [...] Read more.

(This article belongs to the Special Issue **Advance in Mechanical and Thermal Characterization of Polymer Composites (/journal/polymers/special_issues/D03UN7657W)**)

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Development of Crosslinker-Free Polysaccharide-Lysozyme Microspheres for Treatment Enteric Infection (/2073-4360/15/5/1077)

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Polymers **2023**, *15*(5), 1077; https://doi.org/10.3390/polym15051077 (https://doi.org/10.3390/polym15051077) - 21 Feb 2023

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Abstract Antibiotic abuse in the conventional treatment of microbial infections, such as inflammatory bowel disease, induces cumulative toxicity and antimicrobial resistance which requires the development of new antibiotics or novel strategies for infection control. Crosslinker-free polysaccharide-lysozyme microspheres were constructed via an electrostatic layer-by-layer self-assembly [...] Read more.

(This article belongs to the Special Issue **Polymeric Nanoparticles for Biomedical Applications (/journal/polymers/special_issues/polym_nanoparticles_biomed_appli)**)

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Polyphenol Iongel Patches with Antimicrobial, Antioxidant and Anti-Inflammatory Properties (/2073-4360/15/5/1076)

by Gisela C. Luque (https://sciprofiles.com/profile/2718149?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Melissa Moya (https://sciprofiles.com/profile/author/SEhBRXZuckVFejVuNDAxWFFVaEwwYXU2Mk4rMGNVNE9tWFJMTnlVSXNyVT0=?utm_so
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Polymers **2023**, *15*(5), 1076; https://doi.org/10.3390/polym15051076 (https://doi.org/10.3390/polym15051076) - 21 Feb 2023

Abstract There is an actual need for developing materials for wound healing applications with anti-inflammatory, antioxidant, or antibacterial properties in order to improve the healing performance. In this work, we report the preparation and characterization of soft and bioactive iongel materials for patches, based [...] Read more.

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Open Access Perspective (/2073-4360/15/5/1075/pdf?version=1677135437)

Assembling Complex Macromolecules and Self-Organizations of Biological Relevance with Cu(I)-Catalyzed Azide-Alkyne, Thio-Bromo, and TERMINI Double "Click" Reactions (/2073-4360/15/5/1075)

by Adrian Moreno (https://sciprofiles.com/profile/2812423?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Gerard Lligadas (https://sciprofiles.com/profile/1084?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Jasper Adamson (https://sciprofiles.com/profile/author/TWJrVlZ2MkF1bnNxbDVmTjBlTk1Kc0xqL1V4QWlWZ2JlTEZDaTYzYm56ND0=?utm_so
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Polymers **2023**, *15*(5), 1075; https://doi.org/10.3390/polym15051075 (https://doi.org/10.3390/polym15051075) - 21 Feb 2023

Abstract In 2022, the Nobel Prize in Chemistry was awarded to Bertozzi, Meldal, and Sharpless "for the development of click chemistry and biorthogonal chemistry". Since 2001, when the concept of click chemistry was advanced by Sharpless laboratory, synthetic chemists started to envision click reactions

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Open Access Article (/2073-4360/15/5/1074/pdf?version=1676978977)

Bio-Based Polyurethane Foams from Kraft Lignin with Improved Fire Resistance (/2073-4360/15/5/1074)

by Fernanda R. Vieira (https://sciprofiles.com/profile/1882583?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Nuno V. Gama (https://sciprofiles.com/profile/501328?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Dmitry V. Evtuguin (https://sciprofiles.com/profile/151145?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Carlos O. Amorim (https://sciprofiles.com/profile/2471637?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Vitor S. Amaral (https://sciprofiles.com/profile/author/K0RaR29pOWRCMDF5N05FVU1IdkFRZz09?utm_source=mdpi.com&utm_medium=webs
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Polymers **2023**, *15*(5), 1074; https://doi.org/10.3390/polym15051074 (https://doi.org/10.3390/polym15051074) - 21 Feb 2023

Abstract Rigid polyurethane foams (RPUFs) were synthesized using exclusively lignin-based polyol (LBP) obtained via the oxyalkylation of kraft lignin with propylene carbonate (PC). Using the design of experiments methodology combined with statistical analysis, the formulations were optimized to obtain a bio-based RPUF with low [...] Read more.
(This article belongs to the Special Issue **Advanced Properties in Amorphous Polymers (/journal/polymers/special_issues/B70CM31Q75)**)

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Crosslinked Polynorbornene-Based Anion Exchange Membranes with Perfluorinated Branch Chains (/2073-4360/15/5/1073)

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Polymers **2023**, *15*(5), 1073; https://doi.org/10.3390/polym15051073 (https://doi.org/10.3390/polym15051073) - 21 Feb 2023

Abstract To investigate the effect of perfluorinated substituent on the properties of anion exchange membranes (AEMs), cross-linked polynorbornene-based AEMs with perfluorinated branch chains were prepared via ring opening metathesis polymerization, subsequent crosslinking reaction, and quaternization. The crosslinking structure enables the resultant AEMs (CFnB) to [...] Read more.

(This article belongs to the Special Issue **Carbon-Based Functional Polymers: Design, Properties and Applications (/journal/polymers/special_issues/Carbon_Funct_Polym_Des_Prop_Appl)**)

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Thermal and Mechanical Characterization of Epoxy/Polyimide Blends via Postcuring Process (/2073-4360/15/5/1072)

by Yong-Min Lee (https://sciprofiles.com/profile/2626380?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name),
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Polymers **2023**, *15*(5), 1072; https://doi.org/10.3390/polym15051072 (https://doi.org/10.3390/polym15051072) - 21 Feb 2023

Abstract In this study, the effects of polyimide (PI) content and postcuring on thermal and mechanical properties in PI and epoxy (EP) blending systems were investigated. EP/PI (EPI) blending reduced the crosslinking density and improved the flexural and impact strength due to ductility. On [...] Read more.

(This article belongs to the Special Issue **Advanced Epoxy-Based Materials IV (/journal/polymers/special_issues/E7GC3TO48E)**)

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Open Access Article (/2073-4360/15/5/1071/pdf?version=1676972118)

Development, Simulation of Temperatures, and Experimentation in Injection Molds Obtained through Additive Manufacturing with Photocurable Polymeric Resins (/2073-4360/15/5/1071)

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by
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Polymers **2023**, *15*(5), 1071; https://doi.org/10.3390/polym15051071 (https://doi.org/10.3390/polym15051071) - 21 Feb 2023

Abstract Additive manufacturing (AM) is a relatively new option in mold manufacturing for rapid tooling (RT) in injection processes. This paper presents the results of experiments with mold inserts and specimens obtained by stereolithography (SLA), which is a kind of AM. A mold insert **[...] Read more.**
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Electrospun PLA-Based Biomaterials Loaded with *Melissa officinalis* Extract with Strong Antioxidant Activity (/2073-4360/15/5/1070)

by
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Polymers **2023**, *15*(5), 1070; https://doi.org/10.3390/polym15051070 (https://doi.org/10.3390/polym15051070) - 21 Feb 2023

Abstract In the present study, the plant extract *Melissa officinalis* (*M. officinalis)* was successfully loaded in polymer fibrous materials on the basis of a biodegradable polyester–poly(L-lactide) (PLA) and biocompatible polyether–polyethylene glycol (PEG) by applying the electrospinning method. The optimal process conditions for the **[...] Read more.**
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Solventless Photopolymerizable Paper Coating Formulation for Packaging Applications (/2073-4360/15/5/1069)

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by Fábio M. Silva (https://sciprofiles.com/profile/2722799?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ricardo J. B. Pinto (https://sciprofiles.com/profile/189856?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Ana Barros-Timmons (https://sciprofiles.com/profile/489516?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Carmen S. R. Freire (https://sciprofiles.com/profile/339242?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1069; https://doi.org/10.3390/polym15051069 (https://doi.org/10.3390/polym15051069) - 21 Feb 2023

Abstract Nowadays, packaging applications require the use of advanced materials as well as production methods that have a low environmental impact. In this study, a solvent-free photopolymerizable paper coating was developed using two acrylic monomers (2-ethylhexyl acrylate and isobornyl methacrylate). A copolymer, with a [...] Read more.

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Open Access Review (/2073-4360/15/5/1068/pdf?version=1676970593)

Advances in Peptide-Based Hydrogel for Tissue Engineering (/2073-4360/15/5/1068)

by Negar Bakhtiary (https://sciprofiles.com/profile/1926037?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Behafarid Ghalandari (https://sciprofiles.com/profile/1876154?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Farnaz Ghorbani (https://sciprofiles.com/profile/1832880?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name), Swastina Nath Varma (https://sciprofiles.com/profile/2968330?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Chaozong Liu (https://sciprofiles.com/profile/1045017?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1068; https://doi.org/10.3390/polym15051068 (https://doi.org/10.3390/polym15051068) - 21 Feb 2023

Abstract The development of peptide-based materials has emerged as one of the most challenging aspects of biomaterials in recent years. It has been widely acknowledged that peptide-based materials can be used in a broad range of biomedical applications, particularly in tissue engineering. Among them, [...] Read more.

(This article belongs to the Special Issue **Biomacromolecular Applications in Tissue Engineering and Drug Delivery (/journal/polymers/special_issues/tissue_eengineering_drug_deliv)**)

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Open Access Article (/2073-4360/15/5/1067/pdf?version=1676970130)

The Role of Polymers in Halide Perovskite Resistive Switching Devices (/2073-4360/15/5/1067)

by Gregory Soon How Thien (https://sciprofiles.com/profile/2667822?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_nam , Kah-Yoong Chan (https://sciprofiles.com/profile/2080851?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name) and Ab Rahman Marlinda (https://sciprofiles.com/profile/588691?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1067; https://doi.org/10.3390/polym15051067 (https://doi.org/10.3390/polym15051067) - 21 Feb 2023

Abstract Currently, halide perovskites (HPs) are gaining traction in multiple applications, such as photovoltaics and resistive switching (RS) devices. In RS devices, the high electrical conductivity, tunable bandgap, good stability, and low-cost synthesis and processing make HPs promising as active layers. Additionally, the use [...] Read more.

(This article belongs to the Special Issue **Advance in New Energy Materials and Devices (/journal/polymers/special_issues/Energy_Mater_Dev)**)

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Graphene Oxide and Polymer Humidity Micro-Sensors Prepared by Carbon Beam Writing (/2073-4360/15/5/1066)

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Polymers **2023**, *15*(5), 1066; https://doi.org/10.3390/polym15051066 (https://doi.org/10.3390/polym15051066) - 21 Feb 2023

Abstract In this study, novel flexible micro-scale humidity sensors were directly fabricated in graphene oxide (GO) and polyimide (PI) using ion beam writing without any further modifications, and then successfully tested in an atmospheric chamber. Two low fluences (3.75 × 10^{14} cm^{-2} [...] Read more.
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Role of Hydrophobic Associations in Self-Healing Hydrogels Based on Amphiphilic Polysaccharides (/2073-4360/15/5/1065)

by Marieta Nichifor (https://sciprofiles.com/profile/2735844?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)

Polymers **2023**, *15*(5), 1065; https://doi.org/10.3390/polym15051065 (https://doi.org/10.3390/polym15051065) - 21 Feb 2023

Abstract Self-healing hydrogels have the ability to recover their original properties after the action of an external stress, due to presence in their structure of reversible chemical or physical cross-links. The physical cross-links lead to supramolecular hydrogels stabilized by hydrogen bonds, hydrophobic associations, electrostatic [...] Read more.
(This article belongs to the Special Issue Self-Healing Polymers, Proteins and Composites (/journal/polymers/special_issues/self_heal_poly_compo))

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Effects of Europium Complex on Thermal and Photoluminescence Properties of Polyurethane-Europium Materials (/2073-4360/15/5/1064)

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Polymers **2023**, *15*(5), 1064; https://doi.org/10.3390/polym15051064 (https://doi.org/10.3390/polym15051064) - 21 Feb 2023

Abstract A europium complex with double bonds was synthesized with crotonic acid as the ligand and a europium ion as the center ion. Then, the obtained europium complex was added to synthesized poly(urethane-acrylate) macromonomers to prepare the bonded polyurethane-europium materials by the polymerization of [...] Read more.

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Investigating Variation in Compressional Behavior of a Ternary Mixture from a Plastic, Elastic and Brittle Fracture Perspective in the Context of Optimum Composition of a Pharmaceutical Blend (/2073-4360/15/5/1063)

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Polymers **2023**, *15*(5), 1063; https://doi.org/10.3390/polym15051063 (https://doi.org/10.3390/polym15051063) - 21 Feb 2023

Abstract The choice of optimum composition of a mixture of binary and ternary excipients for optimum compressional properties was investigated in this work. Excipients were chosen based on three types of excipients: plastic, elastic, and brittle fracture. Mixture compositions were selected based on a [...] Read more.

(This article belongs to the Special Issue **Advances in Cellulose-Based Polymers and Composites (/journal/polymers/special_issues/LYD3LY6639)**)

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Stimuli-Responsive and Antibacterial Cellulose-Chitosan Hydrogels Containing Polydiacetylene Nanosheets (/2073-4360/15/5/1062)

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Polymers **2023**, *15*(5), 1062; https://doi.org/10.3390/polym15051062 (https://doi.org/10.3390/polym15051062) - 21 Feb 2023

Abstract Herein, we report a stimuli-responsive hydrogel with inhibitory activity against *Escherichia coli* prepared by chemical crosslinking of carboxymethyl chitosan (CMCs) and hydroxyethyl cellulose (HEC). The hydrogels were prepared by esterification of chitosan (Cs) with monochloroacetic acid to produce CMCs which were then chemically [...] Read more.
(This article belongs to the Special Issue **Advanced Stimuli-Responsive Polymer Composites (/journal/polymers/special_issues/Stimuli_Responsive_Polymer_Composites)**)

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Open Access Article (/2073-4360/15/5/1061/pdf?version=1677059523)

Study of Microwave-Active Composite Materials to Improve the Polyethylene Rotomolding Process (/2073-4360/15/5/1061)

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Paola Stagnaro (https://sciprofiles.com/profile/974284?utm_source=mdpi.com&utm_medium=website&utm_campaign=avatar_name)
Polymers **2023**, *15*(5), 1061; https://doi.org/10.3390/polym15051061 (https://doi.org/10.3390/polym15051061) - 21 Feb 2023

Abstract The present paper reports on the formulation and characterization of composite coating materials susceptible to microwave (MW) heating to investigate their application in making the rotomolding process (RM) more energy efficient. SiC, Fe_2SiO_4, Fe_2O_3, TiO [...] Read more. Back to TopTop

(This article belongs to the Special Issue **Advanced Polymer Composite Materials: Processing, Modeling, Properties and Applications (/journal/polymers/special_issues/advanced_polymer_composite_materials)**)

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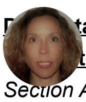
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Review

Polymeric Scaffolds Used in Dental Pulp Regeneration by Tissue Engineering Approach

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Abstract: Currently, the challenge in dentistry is to revitalize dental pulp by utilizing tissue engineering technology; thus, a biomaterial is needed to facilitate the process. One of the three essential elements in tissue engineering technology is a scaffold. A scaffold acts as a three-dimensional (3D) framework that provides structural and biological support and creates a good environment for cell activation, communication between cells, and inducing cell organization. Therefore, the selection of a scaffold represents a challenge in regenerative endodontics. A scaffold must be safe, biodegradable, and biocompatible, with low immunogenicity, and must be able to support cell growth. Moreover, it must be supported by adequate scaffold characteristics, which include the level of porosity, pore size, and interconnectivity; these factors ultimately play an essential role in cell behavior and tissue formation. The use of natural or synthetic polymer scaffolds with excellent mechanical properties, such as small pore size and a high surface-to-volume ratio, as a matrix in dental tissue engineering has recently received a lot of attention because it shows great potential with good biological characteristics for cell regeneration. This review describes the latest developments regarding the usage of natural or synthetic scaffold polymers that have the ideal biomaterial properties to facilitate tissue regeneration when combined with stem cells and growth factors in revitalizing dental pulp tissue. The utilization of polymer scaffolds in tissue engineering can help the pulp tissue regeneration process.

Keywords: biocompatible; biodegradable; polymers; scaffolds; tissue engineering

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1. Introduction

Pulpal pathosis is one of the most common oral diseases due to persistent stimulation from trauma, dental caries, or iatrogenic causes. Dental caries occur because of bacterial infection on the tooth surface, which consists of enamel and dentin. Untreated dental caries trigger an inflammation response in the dental pulp, and chronic inflammation in the pulp tissue leads to permanent healthy tissue loss [1,2].

The current pulpal pathosis treatments are root canal treatment and pulp revascularization [2]. Root canal treatment is the treatment of choice in dentistry, which is effective for severe pulpal pathosis conditions. This treatment has a high success rate, but the tooth loses pulp tissue as a result. Thus, despite the treatment's benefits, the treated tooth becomes nonvital, which increases the risk of fracture and a decrease in the pulp defense mechanism and sensory function [2,3].

Therefore, regenerative endodontic treatment to restore normal pulp functioning via complex dentin–pulp regeneration has recently been developed. The treatment aims to replace the pathological or nonvital pulp tissue with new healthy tissue [2,4].

Regenerative tissue engineering technology is improving rapidly. In pulp tissue regeneration, three important aspects have been developed for their utilization in the technique: stem cells, growth factors, and biomaterials/scaffolds [2,5]. Stem cells represent one of the key elements in tissue engineering technology. Stem cells are unspecialized cells that have the ability to regenerate, proliferate, and differentiate into specific cells [6,7]. After an injury, these cells play a role in healing via tissue regeneration [2,8].

A growth factor or morphogen is a protein or signaling molecule that bonds to specific membrane cell receptors which control and coordinate all cellular functions, such as cell signaling, cell proliferation, and matrix synthesis [6,9]. Growth factors play an important role in increasing the regenerative effect and control function of stem cells. Examples of growth factors that play a role in the signaling process of dentin and pulp regeneration are bone morphogenic proteins (BMP) such as BMP-2, BMP-4, BMP-7, and transforming growth factor β-1(TGF-β1) [4,10,11].

A scaffold or biomaterial is a framework or structure that provides a three-dimensional (3D) growth space for cells and regulates cell function and metabolism. The scaffold creates a microenvironment that promotes cells' regenerative capacities and multipotentialities. These conditions promote tissue regeneration. Recently, many natural or synthetic scaffold materials have been used for pulp regeneration [2,12]. Bioactive scaffolds stimulate the proliferation and differentiation of stem cells into odontoblast-like cells to regenerate pulp tissue [13,14]. Therefore, the role of scaffolds in tissue regeneration is important, becoming the mediator that facilitates the transfer of stem cells and/or growth factors at the location of the local receptor [15].

Each component in tissue engineering has a different effect in supporting the pulp regenerative process, but a combination of these three components gives the best results [2,4]. Dental tissue engineering is expected to provide tooth vitality, with pulp tissue similar to that of a normal tooth. Therefore, it is important to guide cell interactions with extracellular matrices, which is accomplished by using scaffolds and cell culture techniques [15].

This review will describe the latest developments regarding the usage of natural or synthetic scaffold polymers that have the ideal biomaterial properties to facilitate tissue regeneration when combined with stem cells and growth factors to revitalize dental pulp tissue. The utilization of polymer scaffolds in tissue engineering can help the pulp tissue regeneration process. This article is the first to discuss the various types of scaffolds with their various advantages and disadvantages that can be utilized in regenerating dental pulp tissue.

2. The Dental Pulp

Dental pulp is a loose connective tissue that occupies the root canal and is surrounded by dentin. Dental pulp consists of blood vessels, nerves, and odontoblasts, which line the predentine layer in the pulp tissue. Thus, pulp plays a role in providing nutrition, vitality, and pathogen detection through its sensory function as an infection response. Pulp tissue has sensitivity and immunoprotective attributes that maintain pulp homeostasis, facilitate its regenerative ability, and form reactionary dentin [2,16–18].

Histologically, dental pulp consists of several zones: the dentinoblastic zone, the cell-free zone, the cell-rich zone, and the pulp core. The primary cells of the pulp layer are odontoblasts, fibroblasts, macrophages, undifferentiated ecto-mesenchymal cells, and other immunocompetent cells [19,20]. The dentinoblastic zone functionally forms the pulp–dentin complex. This zone is the first line of reparative dentine formation and provides protective responses toward external stimulation, whereas the pulp core is rich in nerves and blood vessels which provide the pulp with nutrition and sensory functioning [2,19].

Therefore, the loss of pulp tissue causes a loss of vitality and sensitivity in the tooth and leads to uncontrolled infections in the surrounding tissues. This condition needs complex treatment, such as root canal treatment, which renders the tooth nonvital and brittle, which influences the patient's quality of life [17,18].

3. Dental Pulp Regeneration

Pulp regeneration is a healing process regarding the injured or lost parts of the dental pulp and results in the re-establishment of its complete biological function [2,21]. Ideal pulp regeneration should generate pulp structure and function as similar as possible to healthy tissue. This regeneration involves the regeneration of the dentin–pulp complex, blood vessels, and nerves, which reach a favorable level of reconstruction through the angiogenesis and neurogenesis processes. Other than that, it also involves the rehabilitation of pulp physiological functioning, represented by sensation, nutrition, and immunological defense [2,6].

Illustrated by the formation of connective tissue, with cell density and an architecture similar to that of healthy pulp, successful pulp regeneration consists of nerves and blood vessels able to secrete new dentin as healthy pulp at a controlled rate. Vascular tissue plays a role in providing nutrition, oxygen, cell immunity, and the recruitment and circulation of cells, which maintains the tissue's vitality and viability, while the nerves are fundamental to cell regulation, which manages the regeneration process and provides defense mechanisms and tissue repair [6,22].

Regenerated blood vessels should be connected to the periapical bone tissue, which surrounds the tooth; therefore, it can receive regular blood flow and transport nutrition for regenerating the tissue or dentin. Other than that, the regenerating tissue should be innervated, with the tooth maintaining heat/cold and pain sensations [17,23]. Therefore, vascular and nerve supply should be maintained through the apical foramen, which is one of the aims of the pulp regenerative process.

In the regeneration process, stem cells proliferate and differentiate into endothelial cells for angiogenesis/vasculogenesis and move into odontoblasts to carry out the dentin reparative process. At the beginning of the process, angiogenic signals, such as fibroblast growth factor (bFGF), vascular endothelial growth factor (VEGF), and transforming growth factor β (TGF-β), are released by endothelial cells, injured pulp cells, and the extracellular matrix (ECM), which causes stem cell migration and stimulates neo-angiogenesis [24,25].

4. Endodontic Regeneration

Infected dental pulp needs root canal treatment (RCT), which is a conservative but effective treatment. Traditionally, in this treatment, the pulp tissue is removed and replaced by synthetic obturation materials, such as paste or gutta-percha [13,17]. RCT aims to remove the space for potential microbiome reinfection and create a healing environment by mechanical or chemical disinfection, which is continued by inert material closure [2,26]. The treatment has a high success rate in dentistry, with 97% of one million teeth able to retain functionality for around 8 years [13,17].

Teeth that receive RCT experience severe defects regarding hard tissue, devitalized pulp from denervation, and avascularity. This leads to an increased risk of fracture, the disruption of the pulpal defense mechanisms, and a loss of physiological functions, such as nutrition and sensation [2,17,27]. In order to prevent these side effects, an effective treatment strategy is needed for the revitalization of the pulp. The emergence of tissue engineering technology and regenerative treatments provides the possibility of developing regenerative endodontic treatments [17].

RCT causes the tooth to be nonvital and susceptible to structural changes [28]; the challenge in modern dentistry is to maintain pulp vitality. Thus, an interdisciplinary approach to regenerative treatments has developed, which utilizes living cells to heal, replace, and restore damaged human tissues and organs to reach their normal level of functioning. One of these treatments is stem cell engineering, which has the potential to be the future of regenerative treatment [29,30].

Dental tissue regeneration can be obtained by the regeneration of each part of a tooth's structure, which consists of enamel, dentin, pulp, alveolar bone, cementum, and periodontal ligament or by regenerating the whole tooth structurally and functionally [15,31]. Regenerative endodontics is one of the endodontic treatments that focus on replacing the damaged pulp tissue through tissue regeneration to restore tooth vitality, leading to an increase in patient quality of life. Regenerative tissue should have healthy pulp properties, such as the ability of the dentin-deposition process, reinnervation, and vascularization [17,26].

5. Tissue Engineering

Tissue engineering technology is an interdisciplinary science that implements the biological principles of regenerative treatment techniques, with a focus on repairing and restoring the biological function of cells, tissues, and organs that have been injured by internal or external factors [6,32]. Tissue engineering technology aims to contribute to the restoration of damaged tissue function and structure by utilizing stem cell interactions, scaffolds/biomaterials, and growth factors. The proper combination of these three elements enables the manipulation of the biomimetic microenvironment containing the vascular system, which normally maintains nutrition supply, waste disposal, inflammatory response, and pulp regeneration [2,6,33]. In tissue engineering, angiogenesis has an important role in nutrition supply and the potential recruitment of stem cells [4,34].

In tissue engineering technology, pulp regeneration might be achieved via the utilization of three key elements: (i) stem cells, (ii) scaffolds, and (iii) signaling molecules such as growth factors. Firstly, the pulp regeneration process might be achieved through stem cell isolation and in vitro manipulation. After this, the cells are cultured in the scaffold and combined with the growth factor, which is then all transplanted into the root canal [35–37].

Every individual element has a different impact on pulp regeneration, but with all elements supporting each other, this might provide a favorable result. The proper combination of these three elements provides a micro-biomimetic environment, influencing the overall accomplishment of pulp regeneration. This result might be achieved by the formation of a fully functional vascular system, thus providing adequate nutrition supply, waste disposal, and inflammation response, leading to satisfactory pulp regeneration [2].

5.1. Dental Stem Cells

Mesenchymal stem cells (MSCs) are a type of stem cell that is suitable for regenerative treatment because of its high proliferation and multipotential ability [29,38]. According to the minimal criteria of the International Society for Cellular Therapy, MSCs are marked with positive (CD29, CD44, CD73, CD90, CD105, and Stro-1) and with negative hematopoietic markers (CD14, CD34, and CD45) [13,39].

MSCs can be isolated from different locations in the oral and maxillofacial regions, such as from dental pulp stem cells (DPSCs) and the stem cells exfoliated from human deciduous teeth (SHED) and can be isolated from healthy pulp tissue. These cells could be differentiated in vitro into adipocytes, odontoblasts, osteoblasts, and chondroblasts, which form dentin or pulp tissue after in vivo transplantation [13,29]. Other cells, such as dental follicle progenitor stem cells (DFPCs), periodontal ligament stem cells (PDLSCs), and stem cells from apical papilla (SCAPs), can be differentiated in vitro into adipocytes, odontoblasts, cementoblast-like cells, and connective tissue [5,13,29,40].

Each type of stem cell has different properties: SHED and SCAP have higher proliferation activity compared to DPSC, although all stem cells possess the potential to regenerate dentin and pulp [5,13].

5.2. Growth Factors

Signaling molecules, such as stem cell factor (SCF), stromal-cell-derived factor (SDF-1α), platelet-derived growth factor (PDGF), basic fibroblast growth factor (bFGF), and granulocyte colony-stimulating factor (G-CSF), can be used for pulp tissue regeneration [17]. Several growth factors, such as SDF-1α, bFGF, and PDGF, are chemotaxis molecules and correlate to blood vessels, nerves, and dentin in the pulp regeneration process. PDGF and VEGF contribute to vasculogenesis/angiogenesis, while NGF contributes to the growth and survival of the nerves; BMP-7 contributes to the differentiation and mineralization of odontoblasts [36,37]. Growth factors play a role in the restoration of stimulation of a structure and the physiology of tissue function in damaged tissue [2].

5.3. Scaffolds

A scaffold is a three-dimensional frame microenvironment that facilitates attachment, cellular infiltration, differentiation, proliferation, and stem cell metabolism with the aid of growth factors. The frame has to provide support for nutrition and oxygen diffusion in the regeneration process and should have biodegradable properties because it will be replaced by the new tissue [4,6,41].

Different types of developed scaffold materials or models have certain levels of flexibility and degradability [6]. Currently, natural or synthetic scaffolds have started to be commonly used in pulp tissue regeneration [2]. The scaffolds that have been used are tissue extracts, such as blood clots, platelet-rich fibrin (PRF), platelet-rich plasma (PRP), tricalcium phosphate ceramic, hydroxyapatite calcium, and mineral trioxide aggregate and synthetic polymers such as polylactic-co-glycolic acid, polylactic acid, and biopolymers such as collagen, hydrogel, hyaluronan, and chitosan [4].

Blood clots represent one type of scaffold that has natural properties from which natural substances such as collagen, chitosan, fibrin, hyaluronic acid, gelatin, alginate, and peptide-based scaffolds can be derived. These scaffolds have been studied as scaffolds for pulp regeneration because of their biocompatibility, biomimetic properties, availability, cost-effectiveness, and ease of conversion (into hydrogel) [13,42].

Other than natural scaffolds, there have been several synthetic polymers developed, such as polyglycolic acid (PGA), poly(d,l-lactide-coglycolide) (PLGA), polylactic acid (PLA), poly(l-lactic) acid (PLLA), and polycaprolactone (PCL), and inorganic calcium phosphates, such as hydroxyapatite (HA) or beta-tricalcium phosphate (β TCP), as well as a combination of silica glass and phosphate. Synthetic scaffolds have been studied considerably as scaffolds that have the potential for tooth regeneration because of their nontoxicity, biodegradability, and ease with which to manipulate properties, including mechanical rigidity and degradation rate [2,15,42].

In contrast to natural scaffolds, synthetic scaffolds can be prepared in unlimited numbers because they are produced in a controlled environment according to a desirable shape. This condition allows for the obtainment of the scaffold in accordance with cell differentiation properties, certain pore characteristics, and certain mechanical, chemical, and degradation rate properties according to the desired application [15,43,44].

This polymer is a biomaterial that is commonly used to form scaffolds with characteristics that are related to differentiation in their composition, structure, and macromolecule arrangement [15]. In recent studies, scaffolds have shown the potential to be bioactive carriers and have recapitulated the interaction between stem cells, progenitor cells, microphysiological environments, and extracellular matrices [13]. In regenerative endodontic treatment, polymer scaffold usage could provide physiological environments to increase the biological performance in the pulp regeneration process. This process consists of revascularization and revitalization processes. This scaffold influences cell migration, viability, discharge, proliferation, recruitment, and degradability [45].

Although scaffolds have huge potential, there are challenges that need to be overcome, such as integrating the scaffold with complicated morphologies without damaging the surrounding tissues. For tooth regeneration, scaffolds require several general characteristics, such as being easy to manipulate, having bioactive and biodegradable properties, having adequate porosity and physical and mechanical strength, having low immunogenicity, and being able to support vascularization [15,43].

Other criteria, such as having an adequate shape, size, and pore volume, are important for the penetration and diffusion of growth factors, nutrition, and waste discharge between the cells [13,15]. Therefore, a scaffold's criteria and design create favorable microenvironments that are important as a foundation to then perform tissue engineering technology processes. This microenvironment supports the organization of cell functioning regarding self-renewal and differentiation, supporting cell and growth factor transportation, creating an environment for cell activities, and promoting communication between cells, which leads to tissue regeneration [2,13,46]. These scaffold characteristics represent important keys to the process of tissue regeneration because they play vital roles in defining cell behavior and tissue formation [13].

To confirm the success of the cell growth and differentiation processes in tissue engineering, scaffold materials must be able to interact with host tissues and provide an ideal environment for tissue growth [29,46]. The ideal scaffold for pulp regeneration should fulfill three criteria: biocompatibility, adequate rigidness to withstand mastication force, and tight sealing with dentin to prevent micro-organism infiltration [29,44]. Other than that, the degradation process of a scaffold is usually one of the factors that plays a role in treatment failure [47]. The rate of scaffold degradation should be complementary to the rate of new tissue formation and should not produce harmful waste side products [15,48,49]. Utilization of the use of scaffolds in tissue engineering technology must fulfill several characteristics which can be seen in Figure 1.

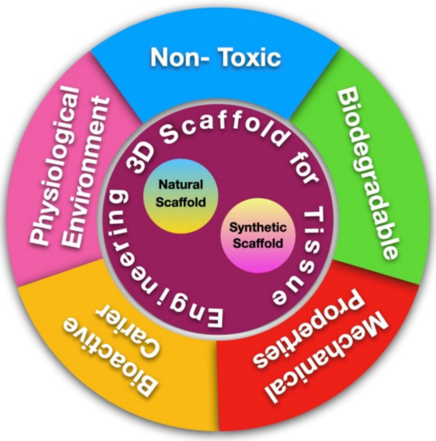

Figure 1. Scaffold for Tissue Engineering.

5.3.1. Scaffolds Made of Natural Polymers

One of the tissue engineering triad elements in regenerative endodontics is scaffolds, which work as biological and structural support for cell growth and differentiation. Proper scaffold selection is a challenge in the dentin–pulp regeneration process [50]. Cells' migration, proliferation, and differentiation correlate with the choice of a scaffold's physical properties, such as appropriate viscoelasticity to mimic the real pulp tissue [51]. The application of scaffolds for dental pulp regeneration should be able to mimic the microenvironment in the root canal and provide mechanical support [52,53].

The application of 3D bioprinting technology to scaffold-making can precisely mimic external and internal morphologies. The 3D scaffold has moderate porosity, which allows nutrition and oxygen infiltration, leading to the occurrence of metabolic activities [53]. The application of scaffolds via the injection process is recommended because it can adapt well to the shape of the pulp chamber and root canal so that cell and matrix interaction can occur efficiently [50].

To date, scaffolds are classified as natural and synthetic scaffolds based on the material source and biomaterial properties used [54]. Scaffolds for tissue regeneration using natural or synthetic materials are continually being developed [55]. Natural scaffolds come from the host or natural materials. Examples of host scaffolds are blood clots, autologous platelet concentrates, and decellularized extracellular matrices [54]. Examples of natural material scaffolds are collagen, alginate, chitosan, hyaluronic acid, and fibrin [50,51,53,54]. Natural material scaffolds have the advantage of cell recognition and adhesion from molecular signaling, although the application of this type of scaffold has the limitation of product variation, risk of pathogen transmission, poor mechanical properties, and immunological responses to foreign objects [52]. The shape of the scaffold can be a porous sponge, a solid block, a sheet, or a hydrogel [56].

Collagen is a scaffold material that has the closest viscoelasticity to real pulp tissue [51]. The combination of natural materials, such as collagen and the host's blood clot, show predictable patterns for tissue formation and mineralization in human dental structures when compared to collagen or blood clots individually. The application of one type of scaffold, such as a blood clot, does not provide stable results for the tissue regeneration process [57]. Instability and unpredictable clinical results from the blood clot are the consequences of unregulated stem cells in the pulp chambers, including the difficulties of bleed formation and hemostasis [52].

When compared to blood clots, platelet-rich plasma (PRP) and platelet-rich fibrin (PRF) provided lower increases in dental root length and less effectivity in root development [58]. PRP from the host's blood contains high platelet, growth factor, and cytokine concentrations, which increase the ability of wound healing and stem cell recruitment from the pulp and increase SCAP proliferation. While PRF contains plentiful growth factors, which can stimulate cell differentiation as well as cell adhesion and migration [59]. The advantages of materials with rich platelet concentrations, such as PRF or PRP, are the increases in the level of angiogenesis and revascularization, which is fundamental to accomplishing endodontic regeneration therapy [56]. Hydrogel-based collagen could mimic the interaction between cells and extracellular matrices in vivo and organize cell growth, which is used for tissue engineering [60].

Polymer materials, such as gelatin and fibrin, are commonly used as natural scaffolds. Gelatin is a biopolymer protein that comes from collagen hydrolysis, which facilitates the proliferation and differentiation of odontoblasts in dental pulp stem cells (DPSCs) [50]. Gelatin is a partial hydrolysate from animals. When compared to gelatin, hydrogel gelatin has better biocompatibility because of its low immunogenicity properties [50,53]. A gelatin-based matrix showed better endodontic therapy results when compared to fibrin-based matrix groups after 12 weeks follow-up in mini-pig immature dental models [50].

Other studies into fibrin-based scaffolds in hydrogel showed that this material was compatible with dental pulp regeneration by supporting pulp-like tissue formation [61]. Fibrin is a natural protein polymer that forms part of blood clot formation. Hydrogel-based fibrin can stimulate pulp-like tissue formation with an odontoblast layer in the root canal system [50]. The advantages of these materials are good cytocompatibility, physical kinetic degradation, and nontoxic degradation products, and they are also easy to inject into the pulp canal. Other natural materials, such as alginate, chitosan, collagen, and hyaluronic acid, or synthetic materials, such as polyethylene glycol, poly (D,L) lactic acid, and fibrin-based bio-ink for 3D printing, were added to increase the structural and functional properties of fibrin scaffolds [61].

Alginate is a natural polymer from algae, which has good biocompatibility properties, is cost-effective, has low cytotoxicity, and has an optimal structure for nutrition exchange [45,52,53]. Alginate hydrogels were formed by crosslinking polysaccharide and divalent cations to form an ion bridge in water-insoluble tissue [52]. Alginate hydrogels are able to arrange themselves in accordance with mechanical properties, such as rigidity and stress relaxation, to regulate stem cell activity [45]. Alginate has proper mechanical properties but can be applied in the form of hydrogel injection or bone porosity, which enables the natural structure to be loaded with growth factor [56] The macroporosity of alginate scaffolds enables the exchange between nutrition and metabolism waste. However, scaffolds that consist of only alginate have a limited role in endodontic regenerative therapy; therefore, its combination with other materials, such as bioactive polymers, is needed [52].

Hyaluronic acid (HA) is a biopolymer that can be modified and processed for biomedical applications, and it can be combined with other materials to increase its favorable properties [60]. HA in dental pulp was found to decrease dental development in the odontogenesis process [52]. When applied to exposed pulp, HA can stimulate the production of reparative dentin. HA can be applied in 3D-sponge form to create a proper environment for blood vessel proliferation and stem cell differentiation [56]. HA is formed by d-glucuronic acid and N-acetyl-D-glucosamine and is commonly available in the form of liquid injection [45]. HA degradation products include pro-angiogenic growth factors, which represent the revascularization elements of dental regeneration tissue, although HA has the disadvantages of poor mechanical properties and can cause hypersensitivity reactions [52].

Chitosan is a widely used natural scaffold [62]. Chitosan is a cation polymer from chitin [55] Chitosan has good biocompatibility, biodegradation, and other favorable biological properties, such as being antimicrobial, fungistatic, and noncarcinogenic, with hemostatic and protein fusion abilities, as well as being able to stimulate cell adhesion, proliferation, and differentiation [55,62]. However, the application of chitosan is difficult because of the complex gelation and degradation process due to unusual polycationics and a highly crystalline structure, which limits the application of this type of scaffold to the form of a natural injection [52]. The hydrogel form of chitosan can be injected into the dental pulp chamber [62]. Chitosan can be applied as an individual scaffold or in combination with polymers or other biomaterials to produce a large number of matrices for tissue engineering purposes. The addition of chitosan scaffolds into the blood for endodontic regeneration procedures can stimulate the formation of new soft tissue (as proven by histological regeneration) without the formation of mineralized tissue around the pulp canal wall [55]. Additional photo-biomodulation therapy could increase in vitro stem cell survival, proliferation, and migration from the root papilla [62].

When comparing several natural scaffolds, other studies have shown that human teeth can be applied as scaffolds for periodontal ligament and pulp regeneration [26]. Scaffolds from natural materials have higher biocompatibility and bioactivity properties when compared to synthetic scaffolds, whereas synthetic scaffolds have higher controlled degradation levels and mechanical properties [63]. The application of scaffolds that are not limited to the use of only one material, i.e., those that can be combined, can provide better endodontic regeneration therapy.

5.3.2. Scaffolds Made of Synthetic Polymers

The implantation of 3D scaffolds in the appropriate living cells that secrete their own extracellular matrix (ECM) can provide an acceptable environment. The adequate porosity and permeability of a polymeric scaffold are essential for guiding and supporting the cultured cells' ability to produce tissue. Synthesizing synthetic biodegradable polymers is challenging in tissue engineering applications [64,65].

The progenitor/stem cells should then be able to attach, travel through, proliferate, and organize themselves spatially in 3D space and differentiate into odontogenic, vasculogenic, and neurogenic lineages with the support of an adequate scaffold for dentin–pulp regeneration. Furthermore, the biocompatibility of the material is critical to avoid any negative reactions from the host tissue. Biodegradability that can be adjusted to match the rate of regeneration is critical for facilitating constructive remodeling. As a result of scaffold deterioration, a series of tissue responses occur, comprising the targeted tissue replacement of the scaffold, vascularization, differentiation, spatial structure, and cellular infiltration [66–68].

Metals, ceramics, and polymers are examples of materials that can be used to make scaffolds. Both dental and bone implants are frequently made of metallic alloys. When it comes to bone tissue engineering, ceramics with strong osteoconductivity have been used, although metals and ceramics have substantial disadvantages because metals do not biodegrade and do not serve as a matrix that mimics biological processes for the proliferation of cells and tissue creation. Additionally, due to brittleness, ceramics are difficult to convert into highly porous structures and have a limited capacity for biodegradation. In contrast, polymers can be molecularly designed to have increased biodegradability and excellent processing flexibility. Therefore, for tissue engineering, polymers are the most common type of scaffolding material [31,68–70].

Biological recognition represents one potential benefit of naturally generated polymers, which may help to stabilize cell adherence and ensure proper function. The synthetic polymers used as scaffolding materials have been spurred on by the challenges associated with natural polymeric materials, such as their complex purification, structural composition, pathogen transmission, and immunogenicity. When compared to naturally occurring extracellular matrix (ECM) proteins, synthetic polymers offer better processing flexibility and no immunological issues. Functionalized scaffolds that combine the benefits of synthetic and natural polymeric materials can be made by adding bioactive molecules to synthetic polymers [69–71].

The advantages of synthetic polymers include nontoxicity, biodegradability, and the ability to precisely manipulate their physicochemical characteristics, such as degradation rate, structural rigidity, microstructure, and porosity [72–74]. Natural polymers are mostly broken down by enzymes, but synthetic polymers are typically broken down by simple hydrolysis. However, because of the relative acidity of the hydrolytically destroyed byproducts, synthetic polymers might cause localized pH reductions and a chronic or acute inflammatory host response [74–76].

Tissue engineering frequently uses poly (-hydroxy acids), such as poly (lactic acid), poly (l-lactic acid), poly (glycolic acid), polyethylene glycol, and their copolymers poly [(lactic acid)-co-(glycolic acid)] (PLGA) and poly-epsilon caprolactone (PCL), which appears to be the most synthetic polymeric material. These polymers have an established track record and have been approved by the FDA for specific human applications (e.g., sutures). Two of the synthetic polymer scaffolds that have been suggested for dental tissue engineering are PGA and PLA, which are biodegradable polyesters that can be produced from a range of renewable sources. When compared to PGA, PLA, which is an aliphatic polyester, is more hydrophobic [66,69,74,76–78].

The synthetic scaffold known as PGA, which has been used for cell transplantation, breaks down when the cells secrete an ECM. Several cell types, including cellular origins of dental pulp, pulpal fibroblasts, and ex vivo human pulp tissue cells, have been shown to be able to adhere and develop on PGA scaffolds. The copolymers of PGA and PLA that are sown with dental pulp progenitor cells have been shown in rabbit and mouse xenograft models to produce pulp-like tissue [66,69,74,75].

Since structural strength is vital in many applications, PLLA, an extremely strong polymer, has been used in several of them. Nanofibrous scaffolds have been created from it that resemble the structure of genuine collagen (a crucial element of ECM). It has been shown that nanofiber PLLA scaffolds promote cell attachment and differentiation. Previous studies demonstrated how PLLA scaffolds could stimulate the development of endothelial cells from dental pulp cells and odontoblasts [66,69,75]. This was demonstrated by utilizing PLGA as a scaffold from which dentin-like tissue could emerge and in which pulp-like tissue could be repaired over the course of 3 to 4 months. A 50:50 blend of PLGA degrades after around 8 weeks. PCL, a slowly disintegrating polymer, has been utilized in bone tissue engineering projects either by itself or in conjunction with hydroxyapatite [75].

A different type of polymer, polyethylene glycol, is utilized in tissue engineering techniques, such as pulp regeneration. Dental pulp progenitor cells have been transformed to create 3D-tissue constructs while being linked to electrospun polyethylene glycol scaffolds. These artificial polymer scaffolds have also been utilized to convey a range of substances, including anti-inflammatory drugs, growth hormones, and sticky proteins. Such scaffolds could not only support cell growth and proliferation but could also reduce pulpitis and aid in pulpal healing. Synthetic polymer scaffolds have better handling characteristics and a more straightforward manufacturing process, which improves their potential for endodontic regeneration. They do, nevertheless, differ significantly from the natural dental pulp extracellular environment. As a result, ECM-based natural scaffolds that are closer to the microenvironment have been developed [66,74,79,80].

Planting human exfoliated deciduous teeth stem cells (SHED) on dentin disks with PLA resulted in the structure of odontoblast-like cells, new dentin, and vascularized pulp-like tissue. A study by Huang et al. illustrated that when implanted in vivo into an empty root canal area, the stem cell constructions made from the apical papilla (SCAPs) and L-lactide, poly-D, and glycoside were able to create soft tissue that resembles pulp, with the continual addition of new dentin to the surface. However, synthetic polymers have the potential to cause an immediate or long-lasting inflammatory response. Additionally, the locally decreased pH brought on by the hydrolytically degraded metabolites may impair its clinical use [66,75].

Several methods have been used to construct 3D scaffolds from poly (hydroxy acids). The inability of the poly (a-hydroxy acids) chains to allow functional groups, however, restricts the incorporation of biologically active moieties onto the scaffolding surface. In order to increase the functioning of these polymers and broaden their usage, significant efforts have been made in this direction; creating copolymers out of a-hydroxy acids with additional monomers that have functional pendant groups, including amino and carboxyl groups, is one technique. In one study, ring-opening polymerization was used to copolymerize (RS)-b-benzyl malate and L-lactide; then, the benzyl groups were removed to create (RS)-b-malic acid) poly (L-lactide) with connected carbonyl compounds [69,81,82].

In order to copolymerize this with L-lactide, benzyloxymethyl methyl glycolide and benzyloxymethyl glycolide are required, which have preserved hydroxyl groups. The matching hydroxylated PLLA copolymers were produced when the benzyloxymethyl groups were unprotected. Comparable carboxylic acid functionalized copolymers can be created using succinic anhydride [69,83].

The researchers created a poly [(L-lactic acid)-co-(L-lysine)] containing a useful lysine residue that they further linked to the RGD peptide. Even though the development of functional groups in random copolymers by lactide/glycolide copolymerization with additional monomers can be successful, this procedure frequently affects the physical characteristics of the starting homopolymers, such as crystallinity and mechanical strength. Numerous block and graft copolymers based on poly(a-hydroxy acid) have been developed and made as a result of this [69,84].

Polymer PEG, or poly (ethylene glycol), is the component that is most frequently used in (a-hydroxy acids). PL(G)A/PEG diblock, triblock, and multiblock copolymers could be made by the ring-opening of PEG and certain catalysts and the presence of glycolide/lactide polymers. However, the hydroxyl or carboxyl (functional groups) in the block copolymers containing PEG are only present at the end of each PEG segment, and the content in these block copolymers is very low, further restricting chemical alterations. Numerous block and graft copolymers made without PEG have been described [69,85].

Amphiphilic poly [hydroxyalkyl (meth) acrylate)] is a variety of biodegradable polymer. Copolymers of -graft-poly (L-lactic acid) (PHAA-gPLLA) with hanging hydroxyl groups were employed to successfully produce 3D-nanofibrous scaffolds. The further functionalization of these copolymers can result in biomimetic scaffolds that are more hydrophilic, degrade more quickly, and have uses in tissue engineering [69,86].

The fabrication of highly porous poly (α-hydroxy acid) scaffolds can be used for tissue engineering based on star-shaped functional poly(ε-caprolactone). The functional groups were added to PCL chains using similar methods. Examples of these methods include the copolymerization of ε-caprolactone and a-chloro-ε-caprolactone to produce functionalized PCL copolymers, and the subsequent addition of carboxyl, pendant hydroxyl, and epoxide groups via atom transfer radical addition. In order to produce the pendant hydroxyl groups in the PCL copolymers, ε-caprolactone was copolymerized with another monomer, 5-ethyleneketal-ε-caprolactone, and the resulting molecule was subsequently deacetylated to convert the ketone groups into hydroxyl groups [69,87].

However, these deprotection processes (as well as the synthesis of these functional comonomers) are typically challenging and time-consuming. Aside from poly (3-hydroxybutyrate), polyurethanes, polycarbonate, poly (ortho ester), poly (propylene fumarate), and polyphosphazenes, other synthetic biodegradable polymers have also been used as scaffolding biomaterials. Comparatively, there are many fewer reports of the functionalization of these biomaterials (a-hydroxy acids), which include the creation of functionalized PC using synthetic methods [69,87,88].

Pendant amino groups were added to PC chains after polymerizing the cyclic carbonate monomer (2-oxo-[1,3]-dioxan-5-yl) carbamic acid benzyl ester and disposing of the protective benzyloxy carbonyl groups. The pendant amino groups' further functionalization was shown using RGD peptide grafting; synthetic efficiency should be considered, given the number of steps in this reaction cycle [69,89].

The five distinctive structural characteristics of these PAs are as follows: (1) an extended alkyl tail that contributes to the molecule's amphiphilic characteristic; (2) maintenance of the structure by possessing four consecutive cysteine residues that create disulfide bonds; (3) a flexible hydrophilic head group due to the three glycine residues in the linker region, which separates the hard cross-linked region; (4) phosphorylated serine residues that interact strongly with calcium ions to encourage mineralization; and (5) an effective RGD peptide [69].

The high electrostatic interaction between molecules causes the PAs to self-assemble into nanofibrous networks when the pH is changed or when divalent ions are added, as evidenced by this study. Additionally, the hydrophilic peptide signals can be displayed in a specific way on the surfaces of the produced nanostructures due to the molecule's amphiphilic characteristics. However, the creation of sufficient mechanical three-dimensional structures from these PAs must be addressed, as is true for several other hydrogel materials. Proteinase-sensitive motifs represent an inventive technique to make biomaterials react to cells [69,90].

As cell-ingrowth frameworks for tissue formation, Hubbell et al. presented a valuable example of how to build synthetic PEG-based hydrogels. The functionalization molecules for PEG chains in hydrogel networks, which also include pendant oligo peptides (RGDSP) for cell attachment, are matrix metalloproteinase (MMP)-sensitive peptides. The material's reaction to the MMPs secreted by cells is controlled by the MMP-sensitive binding agent. This hydrogel, with a PEG foundation, functions as a biomaterial and reacts to cells. The authors also showed that these gels could promote bone regeneration and are efficient delivery systems for recombinant human bone morphogenetic protein-2 (rhBMP-2) [49,69].

Many of the requirements for the dental pulp tissue engineering approach may be accommodated by self-assembling, adaptable, and customizable peptides. Due to the peptide chains' natural amino acid makeup, they can produce biodegradable products. The potential for uniform cell encapsulation, the rapid transport of nutrients and metabolites, and the characteristics of peptide hydrogel systems are affected by their viscoelastic properties, which are comparable to the properties of collagenous tissues such as dental pulp [66,91].

The term "bioceramic scaffolds" refers to a group of materials, including glass ceramics, bioactive glasses, and calcium/phosphate compounds. Calcium phosphate-based (CaP) ceramics are the biomaterials that are utilized most frequently. Due to their characteristics of osteoclast genesis, nontoxicity, antigenicity, osteoinduction, bone bonding, and similarity to mineralized tissues, CaP scaffolds, such as -TCP or HA, have been extensively explored for bone regeneration. Three-dimensional CaP porous granules have demonstrated their potential in the engineering of dental tissue by providing excellent 3D-substrate characteristics for hDPSC growth and odontogenic differentiation. Pure TCP scaffolds are doped with SiO2 and ZnO to increase their mechanical stability and capacity for cellular proliferation. Glass ceramics made of SiO2 Na2OCaOP2O5 are bioactive and offer ideal crystallization conditions. The osteoblastic activity of the substance is increased by the release of dissolving products, such CaP [15,75].

Ceramic scaffolds can be altered to control the dissolving rate, provide the appropriate permeability, and control certain surface properties to promote cellular activity. The mechanical rigidity of the scaffold is influenced by variations in pore size and volume. Glass ceramics made of magnesium can increase mechanical strength and provide a high rate of bioactivity. Excellent hDPSC attachment, proliferation, and differentiation have been demonstrated by niobium-doped fluorapatite glass ceramics [75,92].

The several disadvantages of bioceramics include a longer creation time, the lack of an organic phase, nonhomogeneous particle size and form, huge grains, difficulty to shape, brittleness, slow degradation, and high density. Bioceramics are fragile and have little mechanical strength when individually utilized. This drawback can be remedied by combining them with polymer scaffolds [75,92]. Comparison of various types of scaffolds for tissue engineering can be seen in Table 1.

Table 1. Comparison of various types of scaffolds for tissue engineering.

Article (Author, Year)	Type Scaffold	Properties	Advantages	Disadvantages
Alaribe, 2016; Jang, 2020; Ducret, 2021 [50,61,93]	Fibrin	Biodegradation, protein natural blood clot, hydrogel base, stimulates the formation of odontoblast	High adhesion to surface, good cytocompatibility and biodegradability, nontoxic, easy to inject	Produced by the body after an injury
Alaribe, 2016; Palma, 2017; Moreira, 2021; Raddal, 2019 [52,55,62,93]	Chitosan	Easier to process, hydrogels, films, fibers or sponges, gel-forming abilities; chitosan hydrogels: low viscosity, high adsorption capability. Chitosan, which is the cationic polymer of chitin, has the attractive properties of biodegradability.	It has been used extensively, can support the differentiation of stem cells, noncytotoxicity, biocompatible, biodegradable, antitumor, antifungal, antibacterial activity, nonimmunogenicity, Easily processes, enhances proliferation and cell attachment, hemostatic, noncarcinogenic	Hard use; high crystalline structure: limited application
Amini, 2021; Erisken, 2015; Nosrat, 2019; Ayala-Ham, 2021; Raddal, 2019; Liu, 2022 [51,52,54,57,60,73]	Collagen	It lacks structural stability, good mechanical properties, and a material that is comparable to soft dental pulp's viscoelastic properties, more recommended in combination with a blood clot, hydrogel-based: mimics interactions between cells and ECM in vivo, type 1 collagen is most used.	Low antigenicity, high biocompatibility; biodegradability, bioactivity, and good cell adhesion, high mechanical strength, the ability to cross-link	Problems with controlling space and the rate of degradation, as well as difficulties with sterilization and processing, pathogen transmission low mechanical properties, irregular biodegradation, risks immunogenicity
Amini, 2021; Wu, 2021; Raddal, 2019; Yu, 2019; Nowicka, 2021 [45,52,53,56,73]	Alginate	Requires a multistep purification procedure to achieve extremely high purity, natural polymer from algae; alginate hydrogels: crosslinking polysaccharides and divalent cations, the mechanical properties can be adjusted (alginate hydrogels)	High biocompatibility and biodegradability, low toxicity, chelating properties, and non-antigenicity, cheap price, low toxicity optimal structure for exchange nutrition	Endotoxins, heavy metals, polyphenolic and protein compounds, as well as compounds derived from marine sources, are among the naturally occurring impurities; poor mechanical properties. It must be combined with other polymers.

Table 1. *Cont.*

Article (Author, Year)	Type Scaffold	Properties	Advantages	Disadvantages
Amini, 2021; Ayala, 2021; Raddal, 2019; Wu, 2021; Nowicka, 2021 [45,52,56,60,73]	Hyaluronic Acid	Nanofibrous scaffolds, water insolubility, modified biopolymer; in dental pulp, the amount decreases according to the process of odontogenesis, contains d-glucuronic acid and N-acetyl-D-glucosamine, available in liquid injection form.	Excellent biocompatibility, high water content, suitable viscoelastic properties for many tissue types, capacity to degrade into safe products, and the capability to join to the specific cell surface receptors, reparative dentin stimulation, 3D sponge shape suitable for blood vessel proliferation and stem cell differentiation	It is impossible for the cells to adhere to the surface, low mechanical properties, hypersensitivity reactions, and minor biodegradability
Amini, 2021; Farzamfar, 2017; Gathani KM, 2016; Dissanayaka WL, 2020 [66,73,75,94]	Poly (lactic acid) (PLA)	Good mechanical strength	Biocompatibility, processability, biodegradability; planting human exfoliated deciduous teeth stem cells (SHED) on dentin disks with PLA resulted in the structure of odontoblast-like cells, new dentin, and vascularized pulp-like tissue	Low impact toughness, hydrophobicity, and a slow rate of degradation
Amini, 2021; Gaaz, 2015; Gathani KM, 2016; Dissanayaka WL, 2020; Liu X, 2012 [66,69,73,75,95]	Poly (l-lactic acid) (PLLA)	Excellent porosity, a high surface-to-volume ratio, nanofibers, and a variety of pore-size distributions	Biodegradable, promotes cell attachment and differentiation, PLLA scaffolds encouraged the development of endothelial cells from dental pulp cells and odontoblasts	During degradation, hydrophilicity, biocompatibility, and mechanical properties are all poor
Zhai, 2015; Gathani KM, 2016; Dissanayaka WL, 2020; Liu X, 2012 [66,69,75,96]	Poly (glycolic acid) (PGA)	Highly crystalline and hydrophilic linear polyester, better solubility in water, degradation half-life is about 2 weeks	Help attachment cell	Degradation rate is too high
Barroca, 2018; Amini, 2021; Saini, 2016; Santoro M, 2016; Dissanayaka WL, 2020; Rizk A, 2013; Danhier F, 2012 [66,73,79,80,97,98]	Polyethylene glycol (PEG), Copolymer poly [(lactic acid)-co-(glycolic acid)] (PLGA),	Crystallinity, glass transition temperature, good mechanical Strength	Biodegradable, biocompatible, low toxicity/swelling; these artificial polymer scaffolds have also been utilized to convey a range of substances, including anti-inflammatory drugs, growth hormones, and sticky proteins, and support cell growth and proliferation, reduce pulpitis and aid in pulpal healing	The degradation pattern of PLGA is highly dependent on the sequence of monomers that make up its structure, which liberates acidic products
Mir M, 2017; Amini, 2021; Sisson, 2013; Gathani KM, 2016 [73,75,99,100]	Poly-epsilon caprolactone (PCL)	Good mechanical properties, high elasticity, high strength	Biocompatible, biodegradable, low toxicity, slowly disintegrating polymer, has been utilized in bone tissue engineering projects either by itself or in conjunction with hydroxyapatite	Hydrophobicity, slow degradation, lack of functional groups

Tissue engineering technology requires a scaffold as a porous structure that can assist in tissue regeneration. In addition to various scaffold properties with various advantages needed to provide mechanical support in the regeneration process, tortuosity is also an important parameter in developing the permeability of 3D scaffolds to be used in tissue engineering technology. This affects the occurrence of cell attachment, proliferation, differentiation, and cell migration in the process of tissue regeneration [101,102].

Research on tissue engineering technology has not been widely carried out in humans, so this study cannot discuss how far its success has been when applied to living tissue. Therefore, the application of various types of polymer scaffolds needs to be developed further.

6. Conclusions

Various types of scaffolds, both natural and synthetic, can be used to regenerate dental pulp by utilizing tissue engineering technology. Scaffolds made from natural materials have advantages in cell recognition and molecular signal adhesion, while synthetic scaffolds can be made in unlimited quantities. However, a better effect might be realized if the two types of scaffolds are combined to obtain good mechanical properties so that they can support pulp regeneration properly. In the future, it is hoped that more extensive research can be carried out on various types of scaffolds so that not only polymer-based scaffolds are described for the regeneration of dental pulp tissue.

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