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Special Issue Reprint

Synthesis, Characterization and Application of Polymer-Based Materials

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This Special Issue of *Molecules*, entitled “Synthesis, Characterization, and Application of Polymer-Based Materials”, presents fifteen peer-reviewed contributions that highlight recent advances in polymer science and engineering. The collection includes one editorial, three review articles and eleven original research papers authored by 67 researchers from China, the USA, Japan, Portugal, and Poland. The published works address sustainable polymer synthesis, hybrid and bio-based systems, functional and stimuli-responsive polymers, advanced composites, additive manufacturing, and machine learning-assisted materials design. Several contributions emphasize eco-friendly strategies, interface engineering, and the integration of advanced structural characterization techniques such as synchrotron WAXS/SAXS. Application-driven studies explore polymer systems for energy storage, lightweight structures, adhesives, thermal management, and cultural heritage conservation. All these articles provide a representative overview of current trends in polymer-based materials, underscoring their central role in sustainable technologies, high-performance applications, and emerging manufacturing examples.

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