

Bio-based and Recycled Materials for UV Applications: A Sustainable Approach to Photopolymer Technology

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This paper explores the integration of bio-based and recycled materials in ultraviolet (UV) applications, with a specific focus on their role in advancing photopolymer technology. Photopolymers, widely used in UV-curing processes for coatings, adhesives, and inks, traditionally rely on petroleum-based feedstocks, contributing to environmental concerns. The study investigates the viability of bio-based materials, such as plant-based polymers and agricultural waste, as sustainable alternatives. Key considerations include biocompatibility, mechanical properties, and UV sensitivity in formulating UV-curable materials.

Additionally, the paper delves into the use of recycled materials to promote circular economy principles in UV applications. It assesses the potential of recycled polymers in terms of UV responsiveness and their impact on the overall performance of cured materials. Environmental implications, including reduced carbon footprint, energy consumption, and waste generation, are considered in adopting these sustainable practices.

By addressing challenges and advancements in incorporating bio-based and recycled materials, this research contributes to the ongoing efforts in reducing the environmental impact of photopolymer technology. Furthermore, the paper discusses the economic feasibility and scalability of these sustainable practices, encouraging wider adoption within the industry. Ultimately, this exploration aims to foster a more sustainable future for UV-curable materials, aligning with global initiatives to mitigate resource depletion and environmental pollution.