

Bio-based Resins for Next-Generation Biocompatible Hydrogels

Sustainable 3D Printing Materials for Medical Applications

Fraunhofer IAP develops a new class of bio-based, non-isocyanate poly (hydroxyurethane) (BPHU) resins that combine sustainability, biocompatibility, and UV-curability. These materials are derived entirely from renewable raw resources and can be cured using standard UV-LED systems (385 nm / 405 nm) – eliminating toxic precursors and reducing environmental impact.

Key Features

- 100 % bio-based, non-isocyanate formulation
- UV-curable, compatible with existing DLP and LCD printers
- Adjustable mechanical properties via chemical route:
- Aliphatic: flexible, highly elastic hydrogels
- Aromatic: stiff, load-bearing hydrogels
- Proven biocompatibility (DIN EN ISO 10993-5)
- Designed for customized 3D printed medical devices

Applications

- Artificial pericardium and cardiac implants
- Patient-specific implants and scaffolds
- Advanced tissue engineering materials

Impact

This innovation enables eco-friendly, high-performance hydrogel systems for next-generation medical 3D printing, bridging the gap between sustainability and clinical performance. Based on the latest research by Hennig et al. (2025), Fraunhofer IAP

Fraunhofer Institute for Applied Polymer Research IAP

Dr. Wolfdietrich Meyer
Tel. +49 331 568-1442
wolfdietrich.meyer@iap.fraunhofer.de
www.iap.fraunhofer.de

[exhibit overview](#)