
SBPMat
B-MRS
SOCIEDADE BRASILEIRA
DE PESQUISA EM MATERIAIS
SALVADOR
XXIII B-MRS Meeting 2025
September 28th to October 2nd
BRICS
Brasil 2025

# Tailored Biobased Resins for LCD 3D Printing: Synthesis, Characterization, and Performance

Anderson Marcelino de Arandas[1,2], Alessandra L. Poli[2], Rafael Turra Alarcon[2], Carla Cristina Schmitt[2]

[1]Instituto Federal de Educação, Ciência e Tecnologia do Amapá, [2]Instituto de Química de São Carlos - Universidade de São Paulo

*e-mail: andersonarandas@gmail.com*

The development of photopolymeric resins from renewable sources has gained relevance as a sustainable alternative to traditional fossil-based resins. In this context, unsaturated vegetable oils are renewable, economical, and versatile raw materials for obtaining photopolymerizable monomers suitable for biomaterials and other advanced materials[1,2]. This study describes the synthesis of photopolymeric resins derived from chia, cottonseed, and grape seed vegetable oils, functionalized via epoxidation followed by methacrylation, yielding methacrylic monomers photopolymerizable by a radical mechanism. Structural characterization using $^{1}$H NMR indicated an average of four double bonds per triglyceride molecule before functionalization, with high grafting yields of approximately 88% (cottonseed), 82% (grape seed), and 73% (chia). Photo-DSC assays showed good conversion degrees, especially for cottonseed oil, also enabling optimized parameters for exposure to light during printing. Three-dimensional prototypes fabricated via LCD vat photopolymerization demonstrated good quality and resolution. These results confirm the potential of these sustainable materials for practical applications in additive manufacturing, particularly in the production of scaffolds.

**Acknowledgements**
FAPESP 2021/14879-0 and 2024/03936-1, CNPq 311184/2022-7

**References**

GUITT, Jarno; TAVARES, Marjory B. L.; HUL, Jerzy; YE, Chongnan; LOOS, Katja; JAGER, Jan; FOLKERSMA, Rudy; VOET, Vincent S. D. Photopolymer resins with soybean oil-based biobased methacrylates for stereolithography. ACS Applied Polymer Materials, v. 2, n. 2, p. 949–957, 2020.

ZHANG, Xin; et al. Development of UV-curable resins derived from vegetable oils for 3D printing. Polymers, v. 12, n. 5, p. 1036, 2020.