

## SOYBEAN OIL-BASED ACRYLATE PHOTOCURABLE RESINS FOR DLP 3D PRINTING

Migle Lebedevaite<sup>a</sup>, Greta Motiekaityte<sup>a</sup>, Ausrine Pabricaite<sup>a</sup>, Vaidas Talacka<sup>b</sup>,  
and Jolita Ostrauskaite<sup>a</sup>

<sup>a</sup> Department of Polymer Chemistry and Technology, Kaunas University of  
Technology, Radvilenu Rd. 19, 50254 Kaunas, Lithuania

<sup>b</sup> AmeraLabs, Kestucio str. 6A, LT-44320 Kaunas, Lithuania

Digital light processing (DLP), an optical 3D printing technology, is widely known as a process achieving high resolution products with low raw material consumption [1]. In such technology the replacement of petroleum-derived materials by materials derived from renewable resources will give the ecological and economic benefits due to their high biodegradability, improved recovery and recycling options [2].

In this study, solvent free photocurable acrylate resins with biorenewable carbon content of (75-82) % were composed of by commercially available biobased materials, acrylated epoxidized soybean oil (AESO), isobornyl methacrylate (IBOMA), methacrylic ester (ME), tetrahydrofurfuryl acrylate (THFA), and tetrahydrofurfuryl methacrylate (THFMA). The designed biobased resins were applied in DLP 3D printing technology and exhibited high printing accuracy with good adhesion between layers. Synthesized polymers exhibited yield of insoluble fraction above 95 %, high thermal decomposition temperature and indicated favorable mechanical properties for optical 3D printing. Monitored biodegradability of the synthesized polymers AESO/ME, AESO/THFA, and AESO/THFMA measured by oxygen consumption in a closed respirometer confirmed that such AESO-based polymers could be a competitive solution to replace petroleum-derived polymeric materials in additive manufacturing.

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[1] Skliutas, Edvinas, et al. "A bio-based resin for a multi-scale optical 3D printing." *Scientific reports* 10.1 (2020): 1-9.

[2] Lebedevaite, Migle, et al. "Photocross-linked polymers based on plant-derived monomers for potential application in optical 3D printing." *Journal of Applied Polymer Science* 137.20 (2020): 48708.