

Oral preferred Poster preferred

Supramolecular UPy-Interactions in Photopolymer Networks for Additive Manufacturing

Larissa Ruppitsch¹, Jakob Egger¹, Katharina Ehrmann¹, Thomas Koch², Jürgen Strampfl², Robert Liska¹

¹ Institute for Applied Synthetic Chemistry, Technische Universität Wien, Getreidemarkt 9, 1060 Vienna

² Institute of Materials Science and Technology, Technische Universität Wien, Getreidemarkt 9, 1060 Vienna

Photoresists for SLA-based 3D-printing usually depend on the formation of covalent photopolymer networks, which prohibits their reprocessing or recycling. With the rise of vitrimers, supramolecular interactions have been identified as a versatile tool to introduce such lacking reprocessability or recyclability in polymer networks. However, their use in photopolymers for additive manufacturing is still limited due to the unique challenges for such photoresists: Form-stable specimens have to be produced within only short reaction times, and the photoresist has to be a low-viscous liquid. Here we investigate the potential of Hot Lithography, an SLA-process at elevated temperatures, to process photoresists combining methacrylate and ureidopyrimidione (UPy) motifs as non-covalent crosslinking (Figure 1). Therefore, we introduce the first liquid methacrylic UPy-based monomer in a methacrylic matrix system. The formulation properties and polymerization behavior at room and elevated temperatures have been characterized in depth with RT-NIR photorheology. The materials' thermomechanical performance at varying UPy contents has been probed with DMTA and tensile tests. Finally, we demonstrate the printability of such a resist with a Hot Lithography process and its thermal reprocessing *via* a hot press to underline the potential of this system.

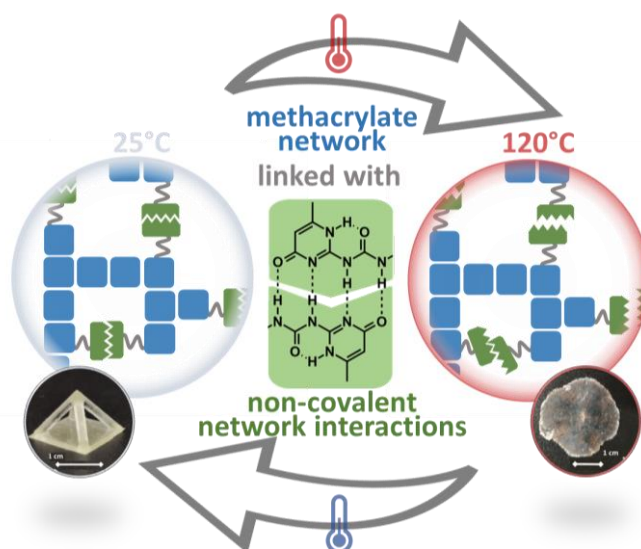


Figure 1: Structure of a ureidopyrimidone-containing photopolymer network at room temperature and 120 °C and reprocessing of a printed part