# EXPLOITING THE VERSATILITY OF THIOL BASED PHOTO CHEMISTRY IN ADDITIVE MANUFACTURING

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The last years have seen an increasing interest in the development of photo-polymerizable resins that provide high biocompatibility[1] and toughness[2] in their cured state. This fact can mainly be explained by the rapid progress in UV based additive manufacturing technologies such as stereolithography, digital light processing or 3D ink-jet printing, which enables the fast and accurate fabrication of tailor-made medical devices. Besides residual monomers, also commercially used photoinitiators (PIs) and their cleavage products provide a significant toxicological potential and thus have to be considered in photopolymers with direct tissue contact.

In this contribution, the versatility of thiol-based photo-click reactions [3] for the realization of tough and biocompatible 3D structures is demonstrated. Besides the utilization of thiols as functional monomers, derivatives of them have been tested successfully as low toxicity photoinitiators. These PIs hardly show any negative effect on the shelf-life of thiol-(meth)acrylate-based resins and, most importantly, the formed cleavage products do not contain reactive aldehyde groups, which are held responsible for skin sensitization reactions, making them interesting for an application in biocompatible resin systems.

Moreover, inspired by the challenges of the actual corona crisis, remaining mercapto moieties at the surface of thiol-based photopolymers have been evaluated for the immobilization of antiviral surface coatings. In this context, the successful immobilization of Cu nanoparticles has been demonstrated providing a remarkable biocide effect and thus the potential to inactivate SARS-CoV-2 at the surface of 3D printed objects.

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[2] Ligon-Auer, S.C.; Schwentenwein, M.; Gorsche, C.; Stampfl, J.; Liska, R. Polym. Chem., 2016, 7, 257.

[3] Lowe, A. B.; Hoyle, C. E.; Bowman, C. N. *J. Mater. Chem* **2010**, *20*, 4745.[3]