DIGITAL LIGHT PROCESSING 3D PRINTING OF MODIFIED LIQUID ISOPRENE RUBBER USING THIOL-CLICK CHEMISTRY

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This work focuses on the additive manufacturing of liquid diene-rubbers with digital light processing (DLP). The principle of the network formation relies in the crosslinking of a methacrylate-functional liquid isoprene rubber via photo-induced thiol-click chemistry. With the help of bi-functional divinyl ethers the viscosity of the resin could be reduced to a suitable range for 3D-printing. Furthermore, an accelerated curing of the diene-rubber across the main chain C=C bonds of the isoprene was achieved. Photo-DSC and FTIR curing kinetics confirmed that the length of the glycol-spacer of the divinyl ether had a significant influence on the overall photo-reactivity of the rubber formulation. Within this study, the highest reactivity was observed for tri(ethylene glycol)divinylether. To improve the storage stability of the thiol-ene formulation, a suitable radical scavenger was applied to avoid premature gelation. The optimized liquid rubber resin allowed the bottom-up DLP 3D printing of precise structures (Figure 1).

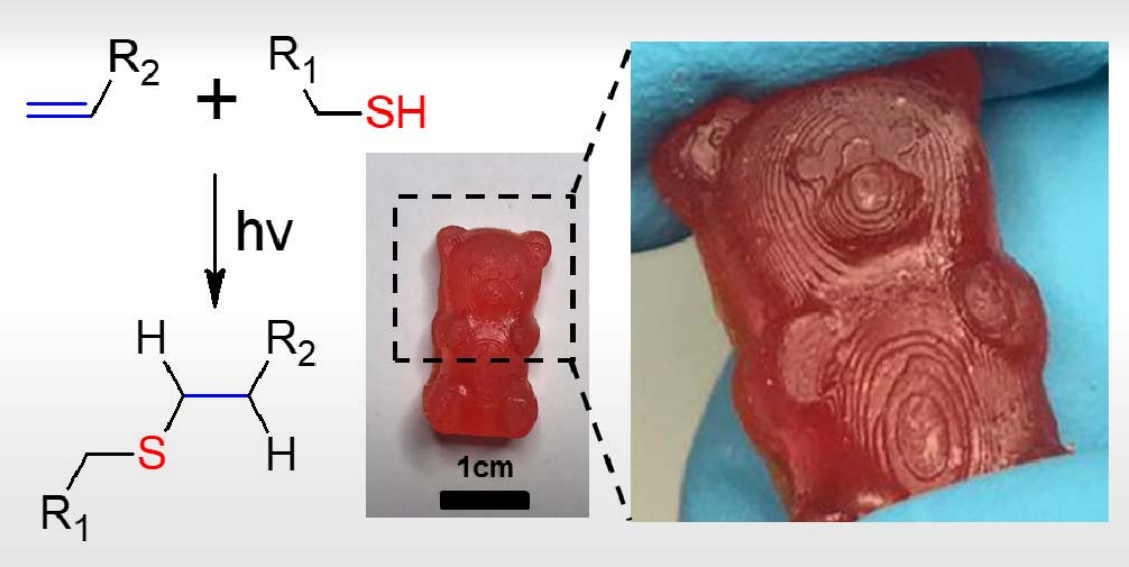

Figure 1. 3D-printed gummy bear with the optimized liquid rubber resin. [1]

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[1] Strohmeier, L.; Frommwald, H.; Schlögl, S. Digital light processing 3D printing of modified liquid isoprene rubber using thiol-click chemistry. *RSC Adv.* **2020**, *10*, 23607–23614. DOI: 10.1039/D0RA04186F.