BIOCOMPATIBLE PHOTOPOLYMERS FOR 3D PRINTING OF MEDICAL DEVICES

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The last years have seen an increasing interest in the development of photo-polymerizable monomers providing low cytotoxicity in their cured state.[1] 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, accurate and individual fabrication of biocompatible structures. In this contribution, the versatility of the thiol-yne photo-click reaction[2] for the fabrication of biocompatible photopolymers is shown at the example of tailor-made alkyne and thiol monomers. It turned out that the synthesized monomers offer curing rates similar to acrylates, while providing much higher conversion and lower monomer cytotoxicity.[3] This fact makes the developed resins interesting for the 3D printing of biocompatible structures such as medical devices.[4]

Not only non-degradable, but also degradable monomers were designed, enabling the selective adjustment of the resorption behaviour of the resulting polymers. Most importantly, selected thiol-yne formulations were printed successfully with an accuracy of 40x40 µm, which seems to be high enough to print medical devices with smooth surfaces or bone scaffolds, where textures with pore sizes of 50-1000 µm are known to support bone ingrowth.[5]

The herein described monomers pave the way towards the fabrication of biocompatible photopolymers with tuneable properties.

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