TOUGHENING PHOTOPOLYMERS: THE CONCEPT OF HYBRID OLIGOMERS

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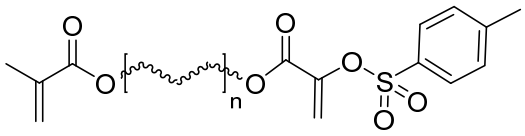
Rapid curing and good mechanical properties are key benefits of methacrylate-based photopolymers that find widespread applications in medicine, coatings and latterly also 3D-printing.

But the high crosslinking density of dimethacrylates leads to several drawbacks, in particular limited toughness and high shrinkage stress. Addition-fragmentation chain transfer (AFCT) agents are capable of overcoming these issues by regulating the free radical chain growth.[1]

In this contribution, we present *heterotelechelic hybrid oligomers* as a new concept to yield tough and low-shrinkage photopolymers. The hybrid oligomer consists of a reactive methacrylate group and a regulating AFCT group[2] within the same oligomeric backbone (see figure). The photocured polymers exhibit a hyperbranched structure, giving rise to improved mechanical properties and solubility, as well as higher overall conversion and reduced shrinkage stress.



Hybrid Oligomer

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[1] G. Moad, E. Rizzardo and S. H. Thang, Polymer, 2008, 49, 1079–1131.

[2] C. Gorsche, K. Seidler, P. Knaack, P. Dorfinger, T. Koch, J. Stampfl, N. Moszner and R. Liska, Polym. Chem., 2016, 7, 2009–2014.