

DIFUNCTIONAL CYCLOPOLYMERIZABLE MONOMERS FOR REDUCED SHRINKAGE OF PHOTOPOLYMERIZABLE NETWORKS

Larissa Alena Ruppitsch^a, Gernot Peer^a, Katharina Ehrmann^a, Thomas Koch^b,
and Robert Liska^a

^a Institute of Applied Synthetic Chemistry, Technische Universität Wien,
1060 Vienna, Austria

^b Institute of Material Science and Technology, Technische Universität Wien,
1060 Vienna, Austria

Cyclopolymerizable monomers (CPM) with non-conjugated dienes as polymerizable unit perform radical polymerization *via* an intra-intermolecular polymerization mechanism (Figure 1). This leads to the formation of cyclic units in the polymer backbone, influencing particularly the shrinkage behavior during photopolymerization. [1] The cyclization tendency can be traced back to the poor

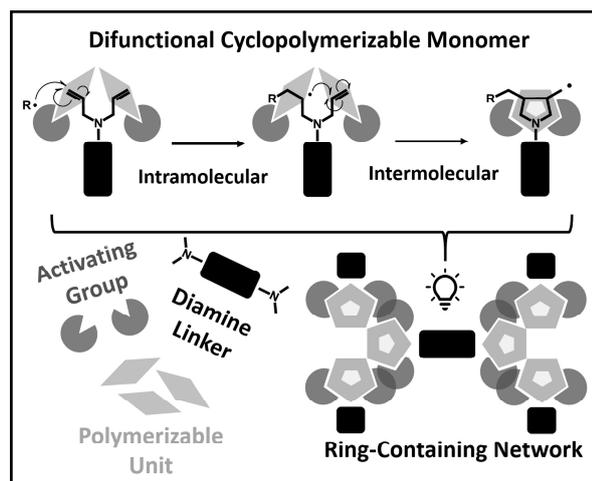


Figure 1: Cyclopolymerization

homopolymerization behavior of the corresponding monoene monomers. State-of-the-art coating applications use allyl-based moieties as CPMs and therefore they were used as basic motif in this study. Novel diamine-linked difunctional 1,6-diene CPMs based on photopolymerizable moieties with varying double bond activation (allyl-, methacryloyl-, and ester-activated allyl-moieties) have been synthesized and characterized to demonstrate their influence on reactivity, shrinkage behavior, and mechanical properties by means of photo-DSC, photorheology, DMTA, and tensile testing upon radical photopolymerization. Comparison between activated CPMs and monoene compounds highlight improved reactivities (up to 60%), reduced shrinkage behavior (up to 40%), and enhanced mechanical properties of these novel difunctional compounds caused by double bond activation and ring formation in the polymer backbone upon curing.

[1] Peer, G., et al., *Photopolymerization of Cyclopolymerizable Monomers and Their Application in Hot Lithography*. *Macromolecules*, 2018. **51**(22): p. 9344-9353.