STIMULI-RESPONSIVE POLYMERS: USING THE REVERSIBLE NATURE OF PENDANT ANTHRACENE GROUPS FOR PHOTOSWITCHABLE AND SELFHEALING STRATEGIES

Simone Viola Radl[a], Thomas Griesser[b], Andreas Oesterreicher[b], Wolfgang Kern[a,b], Sandra Schlögl[a]

[a]Polymer Competence Center Leoben GmbH, Roseggerstrasse 12, 8700 Leoben, Austria
[b]Chair of Chemistry of Polymeric Materials, Montanuniversitaet Leoben, Otto Glöckel-Strasse 2, 8700 Leoben, Austria

In this contribution, we present new approaches towards the preparation of anthracene functional polymers with tunable properties. The work focuses on the design of reversibly crosslinkable polymeric materials that undergo bond formation and cleavage in response to external stimuli. New anthracene derivatives are synthesized and characterized for the use as a reversible crosslinker in epoxy-based resins, elastomers and norbornenes.[1-3] In thin films, the reversible changes in solubility become attractive for the preparation of reversible photoresists enabling the preparation of 2D microstructures and a switching between negative- and positive-type patterns.[2] Along with thin films, the wavelength dependent modulation of thermo-mechanical properties is also demonstrated for macroscopic samples, which shows the versatility of these optically stimuli-responsive networks. Pendant anthracene moieties in polymer materials give the potential for sensing and selfhealing of microcracks in polymers. The results of mechanical testing methods over several repeated repair cycles indicate the repeated healing of the photocrosslinked materials with healing efficiencies of 30% and 70% in terms of storage modulus and flexural stress.[3]

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[2] Manhart, J., Ayalur-Karunakaran, S., Radl, S., Oesterreicher, A., Moser, A., Ganser, C., Teichert, C., Pinter, G., Kern, W., Griesser, T., Schlögl, S., Polymer 2016, 102, 10-20.

[3] Radl, S., Kreimer, M., Griesser, T., Oesterreicher, A., Moser, A., Kern, W., Schlögl, S., 2015, 80, 76-87.