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Photo-induced Mass Transport through Polymer Networks YUAN MENG, MITCHELL ANTHAMATTEN, University of Rochester — Among adaptable materials, photo-responsive polymers are especially attractive as they allow for spatiotemporal stimuli and response. We have recently developed a macromolecular network capable of photo-induced mass transport of covalently bound species. The system comprises of crosslinked chains that form an elastic network and photosensitive fluorescent arms that become mobile upon irradiation. We form loosely crosslinked polymer networks by Michael-Addition between multifunctional thiols and small molecule containing acrylate end-groups. The arms are connected to the network by allyl sulfide, that undergoes addition-fragmentation chain transfer (AFCT) in the presence of free radicals, releasing diffusible fluorophore. The networks are loaded with photoinitiator to allow for spatial modulation of the AFCT reactions. FRAP experiments within bulk elastomers are conducted to establish correlations between the fluorophore's diffusion coefficient and experimental variables such as network architecture, temperature and UV intensity. Photo-induced mass transport between two contacted films is demonstrated, and release of fluorophore into a solvent is investigated. Spatial and temporal control of mass transport could benefit drug release, printing, and sensing applications.

Yuan Meng
University of Rochester

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