SONICATION LABILE PHOTCHEMICALLY CROSSLINKED POLYMERS

Meagan N. Arguien[1], Christopher N. Bowman[1,2]

[1]Materials Science and Engineering Program, University of Colorado Boulder, Boulder, CO, 80309,
[2]Department of Chemical and Biological Engineering, University of Colorado Boulder, Boulder, CO, 80309

In the growing field of polymers, the development of materials that are responsive to external stimuli has gained momentum, especially with the interest in enabling transitions of mechanical or chemical properties to allow a single polymer to be used where previously multiple may have been required. This work integrates mechanophore moieties into polymers to facilitate a mechanical response. A phthalaldehyde moiety is built into polyethylene glycol (PEG) macromers endcapped with reactive alkenes and the macromer is then photochemically crosslinked to synthesize hydrogels that degrade in response to a mechanical trigger, probe sonication. The degradation and subsequent breakdown of the network into soluble byproducts is characterized through rheology, mass loss, and GPC as sonication is applied to the system. The use of mechanical triggers, such as sonication or ultrasound, was leveraged to degrade polymers in optically dense or thermally sensitive environments while maintaining the spatial – temporal control characteristic of photo triggered degradation mechanisms.