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Resilient Synthetic PEG/PDMS Hydrogels Inspired by Natural Resilin[1] JUN CUI, MELISSA LACKEY, GREGORY TEW, ALFRED CROSBY, University of Massachusetts Amherst — Novel synthetic hydrogels are developed by incorporating hydrophobic polydimethylsiloxane (PDMS) into hydrophilic poly(ethylene glycol) (PEG)-based network using thiol-norbornene chemistry. The properties of these hydrogel are comparable to natural resilin, which is an elastic protein, existing in many insects, such as the tendons of flea and the wings of dragonfly, with extraordinary ability of mechanical energy storage. The energy storage efficiency (resilience) of the hydrogels is more than 97% even at tensile strains up to 170%. In addition, the Young's modulus of the hydrogels ranges from 3 kPa to 300 kPa by increasing the volume fraction of the PDMS in the network. These unique properties are attributed to the well-defined network and negligible secondary structure, provided by the versatile and efficient chemistry.

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