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Photochemical Mechanism and Photothermal Considerations in the Mechanical Response of Monodomain, Azobenzene-Functionalized Liquid Crystal Polymer Networks

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Abstract

The potential for wireless transduction of input light energy into mechanical outputs has led to a reinvigorated pursuit of photomechanical effects in polymeric materials and composites. We report here on factors influencing the photochemical mechanism (and thus the mechanical output) in monodomain azobenzene-functionalized liquid crystal polymer networks. Through systematic examination of a representative material with both mechanics and spectroscopic characterization the prevalence of the trans–cis and trans–cis–trans mechanisms is elucidated. Furthermore, the role of light intensity in generating heat (photothermal effects) is also reported.

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