Design and Testing of Mechanochromic Spiropyran-Linked Polymers

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Mechanophores are molecules that utilize mechanical deformation to initiate chemical transformations. Recently, spiropyrans have been established as mechanophores in solid-state polymers. When covalently bound to a polymer of sufficient molecular weight, a visible color change can be observed when the polymeric material is subjected to mechanical deformation. This color change is attributed to a 6-π electrocyclic ring-opening of the spiropyran initiated by mechanochemical transduction of macroscopic forces to the molecular level. Herein, we seek to expand our knowledge of the mechanochemical activation of this mechanophore in the solid-state through the synthesis and mechanical testing of a variety of polymeric materials.