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Viscoelastic Properties of Photo-crosslinked Shape Memory Elastomers[1] JIAHUI LI, CHRISTOPHER LEWIS, DARCY CHEN, MITCHELL ANTHAMATTEN, University of Rochester — Lightly crosslinked polymer networks containing self-complementary hydrogen-bonding side-groups (e.g. ureidopyrimidinones, UPy) have been shown to exhibit unique shape-memory properties. Our synthetic approach, involving photo-crosslinking, enables both the crosslink density and UPy-content to be systematically varied. To better understand how hydrogen bond dynamics impact viscoelastic properties, dynamic mechanical analysis was performed on a series of photo-crosslinked elastomers. The presence of UPy side-groups imparts a broad dynamic transition over a frequency range that depends on the UPy content. The UPy side-group dynamics result in a high level of mechanical damping, and they enable damping characteristics to be tailored. Time temperature superposition (TTS) analysis was performed, and resulting shift factors show Arrhenius behavior. Activation energies were calculated, and elastomers with higher UPy content exhibit higher activation energies.

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