Abstract Submitted
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Photo-programming Semicrystalline Shape Actuators[1] YUAN MENG, JASON YANG, MITCHELL ANTHAMATTEN, Univ of Rochester, ANTHAMATTEN LAB TEAM — A semi-crystalline double network is formed that contains two types of molecular junctions: covalent junctions and reversible molecular linkages. The reversible junctions have the ability to rearrange/reshuffle upon irradiation, and, therefore give rise to a competitive double network architecture that actuates upon crystallization without an applied external load. Poly(caprolactone) networks containing reconfigurable allyl-sulfide linkages are melted, strained to various elongations (hundreds of percent), and irradiated. The network connectivity is reconfigured through a series of light-induced AFCT events, causing a unique built-in stress to be introduced. After irradiation and unloading, the resulting double networks assume a mechanical state-of-ease, and polymer strands adopt biased configurations; when cooled, they crystallize along a preferred direction leading to fully reversible shape actuation. Sample networks can be programmed in multi-steps under constant strain or constant stress, leading to different dynamics and equilibrium states-of-ease. Stress free actuation of 18 percent was achieved.

[1]Pump Primer Award from Univ. of Rochester

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