Abstract Submitted
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**Shape Actuation of Competitive Networks**[1] YUAN MENG, JISU JIANG, MITCHELL ANTHAMATTEN, University of Rochester, Department of Chemical Engineering — We demonstrate a single phase, two-way shape actuator that, in the absence of an external load, elongates upon cooling and reversibly contracts upon heating. In a simple and straightforward process, a partially crosslinked, semi-crystalline PCL network is melted, stretched to several hundred percent strain, and further crosslinked. Upon removal of the applied load, the elastic "double network" adopts a "state-of-ease" that retains part of its former strain. When cooled, internal stress-induced crystallization causes further elongation of the configurationally biased chains; and when heated, crystallites melt, and the sample returns to its equilibrium state-of-ease. Under optimized conditions, reversible actuation of over 15 percent strain can be reproducibly achieved, and samples can be cycled multiple times with highly uniform actuation with no observable creep. The mechanism behind such actuation was further confirmed via calorimetry and X-ray scattering.

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