Abstract Submitted
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Shape Programming through Hierarchic Crystallization of Semicrystalline Elastomers[1] QIAOXI LI, JING ZHOU, SARA TURNER, VALERIE ASHBY, University of North Carolina at Chapel Hill, JAN-MICHAEL CARRILLO, ANDREY DOBRYNIN, University of Connecticut, SERGEI SHEIKO, University of North Carolina at Chapel Hill — Hierarchic organization of semi-crystalline morphology has proved to be key to encoding different shapes at different stages of the crystallization process. We have studied shape transformations as a new tool to gain insights of a crystallization process and then translated the hierarchic crystallization into programmable shape transformations. Reversible transitions between multiple shapes has been achieved through partial melting of a crystalline scaffold, leaving a latent template, which inverts shape recovery by steering crystallization along kinetically preferred pathways replicating the scaffold. A composite model has been applied to interpret the relationship between shape, elastic modulus and crystallinity of semi-crystalline elastomers, assuming morphological transition between isolated crystallites, clusters, and percolated scaffold.

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