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Reversible shape memory SERGEI SHEIKO, JING ZHOU, SARAH WHITE, VALERIE ASHBY, University of North Carolina at Chapel Hill — An "Achilles' heel" of shape memory materials is that shape transformations triggered by an external stimulus are usually irreversible. Here we present a new concept of reversible transitions between two well-defined shapes by controlling hierarchic crystallization of a dual-network elastomer. The reversibility was demonstrated for different types of shape transformations including rod bending, winding of a helical coil, and widening an aperture. The distinct feature of the reversible shape alterations is that both counter-shapes are infinitely stable at a temperature of exploitation. Shape reversibility is highly desirable property in many practical applications such as non-surgical removal of a previously inserted catheter and handfree wrapping up of an earlier unraveled solar sail on a space shuttle.

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