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Pattern Transformation Triggered by Deformation

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Periodic elastomeric cellular solids are subjected to uniaxial compression and a novel uniform transformation of the structure is found above a critical value of applied load. The results of a numerical investigation reveal that the pattern switch is triggered by a reversible elastic instability. The mechanism has proved to be useful for controlled imprinting of complex patterns in phononic and photonic crystals. The material also provides an example of a simple, tunable and robust negative Poisson ratio foam. More recently, the inverse problem of an appropriate array of elastic particles has been shown to provide another example of an intriguing pattern switch.