Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Morphological transformations triggered by temperature changes

DAMIANO PASINI, LU LIU, McGill University — Biological materials can often adapt their micromorphology to efficiently respond to and accommodate temperature changes dictated by the environment in which they live. In this work, we follow this strategy and introduce a class of compliant metamaterials that are programmed to exhibit morphological transformations in response to a set of temperature variations. Shape transformation mechanisms are designed in each building block by finite element simulations, and used to fabricate proof-of-concept metamaterials that are responsive to temperature fluctuations. A soft elastomer is casted into a rigid periodic frame that can reproduce scaling, axial or shear deformation. The result is a metamaterial that can accomplish macroscopic shape transformations that are reversible and governed by the level of temperature of the surrounding environment.

Damiano Pasini
McGill University

Date submitted: 11 Nov 2016 Electronic form version 1.4