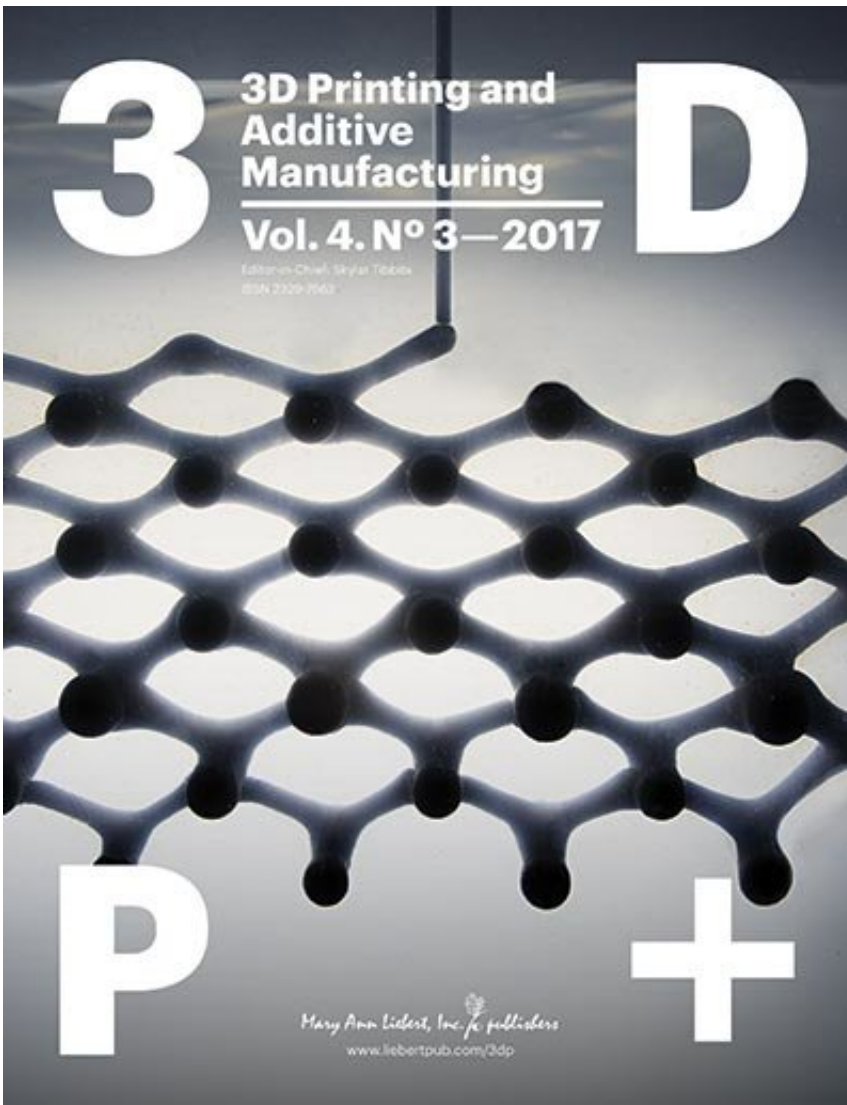


Researchers achieve 4-D printing of programmable shape-changing structures

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3D Printing and Additive Manufacturing is the only peer-reviewed journal focused on the rapidly moving field of 3D printing and related technologies. Credit: Mary Ann Liebert, Inc., publishers

A new study describes 3D printing of Shape Memory Polymers to produce active meta-materials that can be programmed to form versatile shapes and are then able to recover their original state when heated to above their activation temperatures. This innovative combination of 3D printing, thermoviscoelastic meta-materials, and programmable design to create 4D shape-transforming structures is reported in an article published in *3D Printing and Additive Manufacturing*.

Marius Wagner, Tian Chen, and Kristina Shea, Swiss Federal Institute of Technology Zurich, present the details of their fabrication method, experimental design, and the results of simulation studies to evaluate the transformational behavior of the meta-materials in the article entitled "Large Shape Transforming 4D Auxetic Structures." The researchers demonstrate that the active meta-materials can achieve large area changes of up to 200% within a programming and recovery cycle. A specific example shows the fabrication of a multi-letter-based [structure](#) that is then programmed into a jumbled circular shape and is able to regain its original structure on temperature-based activation.

"This work provides a significant step forward in 4D printing capabilities and is a wonderful example of the blending together of materials, mechanics, and design to enable such beautiful results," says Editor-in-Chief Skylar Tibbits, Director, Self-Assembly Lab, MIT, and Founder & Principal, SJET LLC.

More information: Marius Wagner et al, Large Shape Transforming 4D Auxetic Structures, *3D Printing and Additive Manufacturing* (2017). [DOI: 10.1089/3dp.2017.0027](https://doi.org/10.1089/3dp.2017.0027)

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