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**Origami structures for tunable thermal expansion** ELISA BOATTI, KATIA BERTOLDI, Harvard Univ — Materials with engineered thermal expansion, capable of achieving targeted and extreme area/volume changes in response to variations in temperature, are important for a number of aerospace, optical, energy, and microelectronic applications. While most of the proposed structures with tunable coefficient of thermal expansion consist of bi-material 2D or 3D lattices, here we propose a periodic metastructure based on a bilayer Miura-Ori origami fold. We combine experiments and simulations to demonstrate that by tuning the geometrical and mechanical parameters an extremely broad range of thermal expansion coefficients can be obtained, spanning both negative and positive values. Additionally, the thermal properties along different directions can be adjusted independently. Differently from all previously reported systems, the proposed structure is non-porous.

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