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Materials with Tailored Thermal Expansion Coefficient KATIA BERTOLDI, JIA LIU, SICONG SHAN, SUNG HOON KANG, Harvard University — Designing materials with tailored coefficient of thermal expansion (CTE) has applications in a number of fields, including biomedical and mechanical engineering and solar energy. It is particularly important to combine a desired (usually low) CTE with mechanical robustness. Most of previous work has been focused on designing low-CTE materials by modifying compounds at the chemical level. It is also possible to design materials with tailored CTE by using specific topologies of different materials to achieve overall properties outside the range of the constituent materials. Here, we exploit buckling in laminated periodic structures to design materials whose coefficient of thermal expansion can be tuned (from positive to negative) by varying the unit cell geometry.

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