

Abstract Submitted
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Negative Thermal Expansion and Other Elastic properties of a Class of Solids YAN HE, VLADIMIR CVETKOVIC , CHANDRA VARMA, University of California Riverside — We consider the thermal expansion, change of sound velocity with pressure, and the Poisson ratio of lattices which have rigid units (with very large stiffness to change in bond-length and to bond-angle variations) connected to other such units with springs with largest stiffness for bond-stretching compared to that required for bond-angle variation at the rigid unit-spring connection. The hierarchy of force constants leads to a negative thermal expansion coefficient over a large range of temperature as well as allows calculation of elastic properties, in particular the Gruneisen constant and the Poisson ratio. We find, consistent with experiments, that crystals with negative thermal expansion coefficients also have sound-velocities which go down with temperature. We also find a very weakly negative Poisson ratio for such solids.

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