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Mechanical response of ultralight nickel kagomé structure to compression[1] PANKAJ RAJAK, RAJIV KALIA, AIICHIRO NAKANO, PRIYA VASHISHTA, Univ of Southern California — Deformation behavior of an ultralight architecture consisting of hollow Ni nanotubes and solid nanorods arranged as a 3-D kagomé structure is studied using Molecular dynamics simulations. As a precursor, we have also investigated mechanical response of a single hollow Ni nanotube and nanorod under uniaxial compression. We observe that 1/6(112) Shockley partial dislocations and twin formation at 3.5% compression collapse the nanotube and nanorod. Kagomé structure made from solid nanorods shows deformation both near the node of kagomé lattice and the eight beams connected to it for compression above 5%. In the case of hollow nanotube architecture, most of the deformation is observed near the node of the kagomé structure for strains higher than 6%. At 8% and 12.5% compression, we observe plastic buckling of solid and hollow architecture, respectively. Hence hollow nanotube architecture can withstand much larger compression with very little deformation of the system than the solid nanorod architecture. The deformation in all these systems is caused by 1/6(112) Shockley partial and 1/2(110) dislocations.

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