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**Anharmonic Phonons in Vanadium Alloys and Compounds.** OLIVIER DELAIRE, MAX KRESCH, MATTHEW LUCAS, REBECCA STEVENS, CALTECH, JORGE MUNOZ, UTEP, BRENT FULTZ, CALTECH — Using inelastic neutron scattering, we investigated the temperature-dependence of the phonon density of states (DOS) of pure BCC vanadium and vanadium alloys V-6.25%X, with X a transition metal solute, as well as the A15 compounds V3Si and V3Ge. Phonons in pure vanadium exhibit an anomalous stiffening with increasing temperature up to 1000C. The addition of 6.25% impurities in solid solution changes this behavior. Solutes to the right of vanadium in the periodic table induce a reversal to the expected quasiharmonic softening with thermal expansion, solutes to the left increase the stiffening. V3Si and V3Ge also exhibit strong phonon stiffenings up to 500C. Anharmonic couplings arising from phonon-phonon or electron-phonon interactions are used to explain the departure from the quasiharmonic behavior. Using differential scanning calorimetry, we measured the heat capacity of vanadium and its alloys up to 1400C, and related it to the temperature-dependent phonon DOS. We compare our findings to theoretical studies of the effect of phonon-phonon and electron-phonon couplings on the heat capacity.

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