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Phase Stability and Equation of State of Vanadium and V-Ti alloys to 220 GPa[1] ZSOLT JENEI, HYUNCHAE CYNN, WILLIAM J. EVANS, Lawrence Livermore National Laboratory, SIMON MACLEOD, Atomic Weapons Establishment, UK, STANISLAV SINOGEIKIN, YUE MENG, HPCAT — Experimental studies of vanadium found that during compression it undergoes a phase transition from the low pressure body centered cubic crystal structure to a rhombohedral phase at 65 GPa when compressed under quasihydrostatic conditions and as low as 30 GPa under uniaxial compression (PRB 83, 054101). Theoretical studies are in reasonable agreement with the transition pressure and predict that upon further compression above 200 GPa the bcc phase becomes stable again. The latest study (PRL 103, 235501) predicts that alloying vanadium with small amounts of the neighboring elements can increase or decrease the stability of the bcc phase relative to the rhombohedral phase. We performed powder x-ray diffraction experiments in diamond anvil cell of pure vanadium and V-Ti alloys at ambient temperature up to 220 GPa. In this paper we will discuss our findings related to the stability of the high pressure rhombohedral phase of the pure vanadium and the equation of state, and the influence of the alloying on the EOS.

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