

Modulated structures in group VIa elements at high-P and high-T

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Incommensurately (IC) modulated structures in elements at high pressures have recently been shown to be a well established and frequently encountered phenomenon [1]. The group VIa elements S [2], Se [3] and Te [4] have non-composite IC modulated structure with superspace group $I'2/m(0q0)s0$. In Te the single phase IC Te-III is stable from 4.5 to 29.2GPa, single phase IC Se-IV above 41GPa, and single phase IC S-III above 95GPa. Sulphur was measured at ESRF on ID09 and is the first element with an incommensurately modulated structure above 100GPa.

Te-III is known to be stable over a wide pressure range at 300K. New high-P high-T measurements performed at ESRF on ID09 study the stability of this modulated phase at elevated temperatures (Fig. 1) as well as the T-dependence of the incommensurate wavevector q .

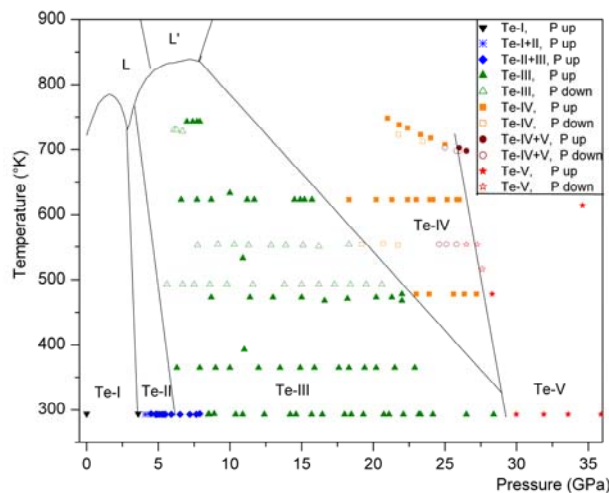


Fig. 1: Phase diagram of Te up to 35GPa and 900K showing measured data points. The melting curve and phase boundaries between the two liquid phases and between the Te-I \rightarrow Te-II phase boundary are taken from [5]. The Te-III \rightarrow Te-IV and Te-IV \rightarrow Te-V phase boundaries were determined from the first appearance of the higher-pressure phase on pressure increase.

References

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