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Shock-Melting of Tin from Sound Velocities Measurements JIAN BO HU, XIAN MING ZHOU, HUA TAN, Laboratory for Shock Wave and Detonation Physics Research, Institute of Fluid Physics, Chinese Academy of Engineering Physics, Mianyang 621900, SHOCK WAVE PHYSICS TEAM — In this paper, an improved reverse-impact technique was used to measure sound velocities of tin at the pressure range of 37GPa $\sim$ 80GPa, using time-resolved velocity interferometer system for any reflector (VISAR). Bulk and longitudinal sound velocities can be obtained simultaneously by this technique with the precision of about 5% and 2%, respectively. Experimental results are consistent with the thermodynamic calculations for the γ phase of tin. Results also show elastic-plastic transition in the release process disappears gradually and longitudinal sound velocity is changed gradually to bulk sound velocity with Hugoniot stress increasing. In combination with phase diagram of tin, it is suggested that pre-melting is occurred before the bulk melt because of the energy depositing in the grain boundary. Only the location of completely shock-melted state can be determined from sound velocities measurements.

Jian Bo Hu
Laboratory for Shock Wave and Detonation Physics Research,
Institute of Fluid Physics, Chinese Academy of Engineering Physics,
Mianyang 621900

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