

Ultrafast XRD observation of laser-shock induced lattice dynamics

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Materials at high pressures and temperatures are of great current interest for warm dense matter (WDM) physics, planetary sciences, and inertial fusion energy research. At the high-energy density (HED) conditions, the micro-structures of material significantly influence the behavior and properties[1]. Ultra-short X-ray pulse, i.e., X-ray free electron laser (XFEL), is a unique and powerful tool to directly observe a structure and to reveal the time scale of the structural change under the dynamic high pressures. Here we present recent experimental results on lattice dynamics associated with shock-induced phase transformation of metals and insulators using high-power laser and XFEL[2,3].

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