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Solidification and fcc- to metastable hcp- phase transition in krypton under modulating dynamic pressures[1] JING-YIN CHEN, Lawrence Livermore National Laboratory, CHOONG-SHIK YOO, MINSEOB KIM, Department of Chemistry, Institute for Shock Physics, Washington State University, HANNS-PETER LIERMANN, Photon Sciences-PETRA III (FS-PE), Deutsches-Elektronen Synchrotron, HYUNCHAE CYNN, ZSOLT JENEI, WILLIAM EVANS, Lawrence Livermore National Laboratory — We describe high-pressure kinetic studies of the solidification, melting and fcc-hcp transitions of Krypton under dynamic loading conditions, using a *dynamic*-diamond anvil cell (*d*-DAC) coupled with time-resolved x-ray diffraction. The time-resolved diffraction patterns and dynamic pressure responses show compression-rate dependencies associated with both the decay and growth time constants of the liquid-solid and solid-liquid transitions. According to the Avrami equation, both the solidified and melting processes are spontaneous nucleation and a rod-like (1-D) growth. Furthermore, under dynamic loading conditions, Kr-hcp forms from fcc close to the melting line. The nucleation time of fcc and hcp are very fast, with little dependence of compression rates or shorter than the time resolutions. The threshold pressure for the formation of Kr-hcp is $\sim$ 0.8 GPa at the dynamic loadings of 0.004-13 GPa/s.

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