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Kinetics of Phase Transition Under Tailored Dynamic Compression JEFFREY H. NGUYEN, Lawrence Livermore National Laboratory, DANIEL ORLIKOWSKI, J. REED PATTERSON, L. PETER MARTIN, NEIL C. HOLMES, Lawrence Livermore National Laboratory — High Pressure-High Temperature phase boundaries are typically mapped out in static compression experiments where the kinetics of these phase transitions are not fully explored. Dynamic compression experiments, on the other hand, are traditionally limited to the principal Hugoniot or the principal quasi-isentrope. Recent advances of the functionally graded density impactor now allow us to explore the phase diagram of materials in previously inaccessible regions of the PVT phase diagram and at strain rates comparable to the time-scales of many phase transitions in metals and molecular liquids. We present here experiments exploring liquid-solid and solid-solid transitions on principal and "hot" quasi-isentropes. Our principal focus will be on the liquid-solid transition in water, but we will also discuss other solid-solid transitions in metals as appropriate. These phase transitions have been characterized with changes in both the particle velocity and optical properties. The kinetics of the water-ice transition will be discussed in terms of changes in the optical properties in addition to the time evolution of the ice volume fraction during the transition. This work was performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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