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Phase transformation kinetics - equilibrium and metastable conditions MARINA BASTEA[1], S. BASTEA, J. REAUGH, D. REISMAN, Lawrence Livermore National Laboratory — The kinetics of first order phase transformations has been a topic of great experimental and theoretical interest. The development of new high pressure techniques has brought new perspectives on this problem and new insights on long-standing scientific puzzles e.g. the formation of natural diamond and the freezing of water. Dynamic compression experiments afford the study of equilibrium and non-equilibrium processes occuring on very short time-scales - 10^{-12} to 10^{-6} s, which are otherwise difficult to investigate with most traditional static high pressure techniques. I will discuss results on the freezing of water and diamond formation along quasi-adiabatic high pressure paths. For water the emphasys will be on dynamic features resembling Van der Waals loops while for carbon I will present results on diamond formation from different initial condition states. Both systems exhibit a large metastability range. A comparison with near-equilibrium phase transformations in other materials will also be included. 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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