STRAIN-RATE AND TEMPERATURE EFFECTS ON KINETICS AND PHASE TRANSITIONS FOR ALBITE AND OLIVINE COMPOSITION. Melissa Sims[a], Melinda Rucks[a], Sergey Lobanov[a], Jordan Young[a], Kip Daly[a], Anna Pakhomova[b], Zuzana Konopkova[b,c], Ross Hrubiak[d], Yue Meng[d], Hanns-Peter Liermann[b], Matthew L. Whitaker[a,e], Timothy D. Glotch[a,] and Lars Ehm[a,e]

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During and after large meteor impacts, high-pressure mineral phases are often found to have nucleated [1, 2]. These phases are used to identify the pressure and temperature conditions reached during impacts [3, 4]. The pressures and temperatures reached can suggest properties of the impactor [2, 5-8]. However, the effects of kinetics and strain-rate on the nucleation of these high-pressure phases are relatively unconstrained [5]. We completed rapid compression and decompression laser-heated membrane diamond anvil cell (mDAC) experiments with in-situ X-ray diffraction [9]. We studied olivine and plagioclase in order to examine phase formation and kinetics at high pressure and temperature. The compression and decompression rates were between 0.05-0.9 GPa/s up to pressures around 50 GPa. The strain rate is around 1000 times lower than a natural event. The strain rates allow us to observe overpressure effects and transformation mechanisms in detail. These experiments have allowed us to identify some of the complex interactions, including thermodynamics, kinetics, and deformation processes, that likely play a role in natural events and are previously unexplored.

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