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In-situ x-ray diffraction of a shock-induced phase transition in fluorite, CaF_2 BENNY GLAM, SALLY JUNE TRACY, Dept. of Geosciences, Princeton University, STEFAN TURNEAURE, Washington State University, THOMAS DUFFY, Dept. of Geosciences, Princeton University — The difluorides are an important class of ionic compounds that show extensive polymorphism under both static and dynamic loading. In this study, the shock-induced phase transitions in CaF_2 were investigated by in situ x-ray diffraction measurements in plate impact experiments carried out with the two-stage gas gun at the Dynamic Compression Sector of Argonne National Laboratory. Single-crystal samples in (100) and (111) orientations were shock loaded to pressures between 32 GPa to 70 GPa. The particle velocities at the interface between the sample and a LiF window were measured by VISAR and PDV. Synchrotron x-ray diffraction data were recorded at 153.4 ns intervals using a four-frame detector. The measured diffraction patterns show a high degree of sample texturing at all pressures. We observe evidence for a transition to a high-pressure phase followed by reverse transformation at late times during release. This study provides the first direct constraints on the high-pressure lattice structure of fluorite under shock compression.

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