

Raman study of apatite amorphised with swift heavy ions under various irradiation conditions

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Crystallographically oriented Durango fluorapatites were exposed to swift heavy ions (Xe, Ta, Au, U) at different irradiation conditions. Beam-induced sample modifications were investigated with respect to the effect of fluence (10^9 – 10^{13} ions/cm²), electronic energy loss (18–27 keV/nm), and pressure (3.6–11.5 GPa) applied during irradiation. In situ high-pressure irradiation was performed in diamond anvil cells. Confocal Raman spectroscopy was used to trace the occurring changes in the crystal lattice. Fragmentation of the crystal specimen depends on the orientation and sample thickness and was found to scale with energy loss and fluence. The radiation damage for irradiation along the *c*-axis was found to be larger than for the $\langle hk0 \rangle$ direction, independent of the confining pressure. Observations on samples irradiated at high pressures indicate a stabilising effect, leading to reduced amorphisation in comparison to the samples irradiated without pressure.