Study on structural properties of swift heavy ion induced damage in Al_2O_3

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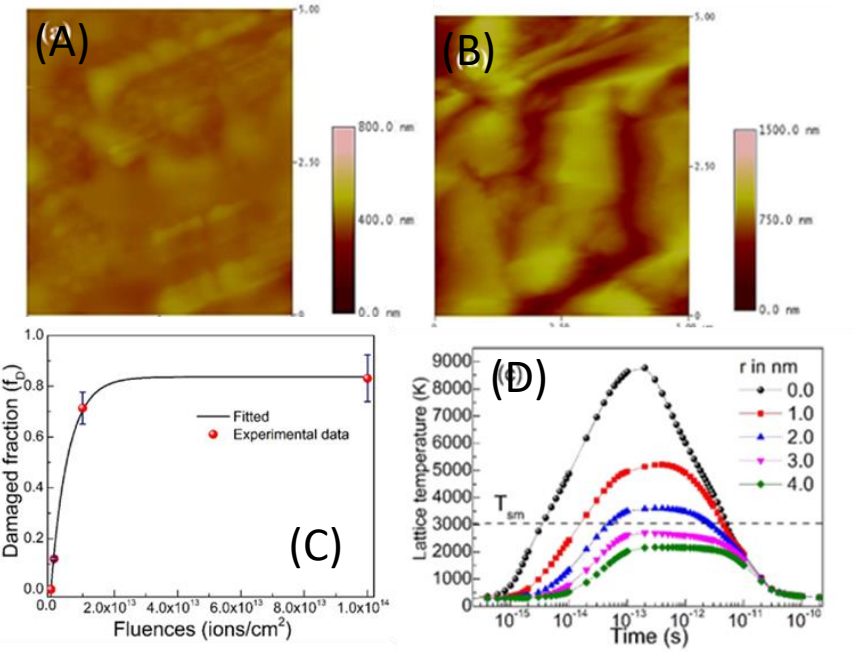

Figure Caption: (a) Pristine & (b) irradiated 5x5 µm AFM image (c) Variation of damaged fraction as a function of Au fluence for (012) diffracted peak (d) Variation of lattice temperature as a function of time for different radii around the ion track for Se =17.19 keV/nm and Sn =5.5 ×10^3 keV/nm using u-TS model.

The radiation response of polycrystalline α-Al2O3 for 100 MeV Au ions irradiation for the fluence up to 1E14 ions/ cm2 has been investigated. The influence of SHI irradiation on the structural and morphological properties are analyzed. Disorder fractions, damage cross-section, and latent track radius are calculated using XRD analysis. Increased surface roughness post irradiation due to electronic excitation is investigated using FESEM and AFM analysis. The experimentally observed latent track and radiation-induced damage are further verified with the help of the thermal spike model. At very high lattice temperature, the molten zone around the ion track are formed and subsequent rapid quenching of the material due to the cooling of the lattice subsystem results in a disordered structure of Al_2O_3 around the ion track which is responsible for damage induced structural degradation as obtained by XRD and PL.

Radiation Physics and Chemistry Vol.212, Nov-2023, 111128

https://doi.org/10.1016/j.radphyschem.2023.111128