

Stabilization and annealing of interstitials formed by radiation in binary metal oxides and fluorides

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Nuclear Instruments and Methods in Physics Research B 266 (2008) 2868–2871

The manifestations of non-impact creation mechanisms of Frenkel defects have been revealed in MgO and α -Al₂O₃ crystals irradiated at 295 K by 2.20–2.4-GeV U ions providing an extremely high density of electronic excitations. Besides F and F₊ centers, the creation of anion vacancies has been detected in both ion-irradiated crystals by measuring the emission spectra at the excitation by 5-keV electrons at 9 K. In MgO, the stabilization of oxygen interstitials is conducted by their association with the holes localized near cation vacancies. The creation, stabilization and annealing of F centers, impurity defects and trifluorine F₃ molecules have been investigated in LiF:Mg,Ti irradiated by X-rays or 10–17 eV photons. The role of separated electrons and holes, anion excitons and near-impurity excitations in the formation of thermally stimulated luminescence at 350–750 K has been clarified. Stabilization (up to 650 K) of H interstitials in LiF occurs via the formation of F₃ molecules.