SAND2011-3595C

In-situ Ion Beam Induced Luminescence/Imaging of Scintillating Materials

J.V. Branson, K.Hattar, B.A. Hernandez-Sanchez, B.L. Doyle

Ion beam induced luminescence (IBIL) is an important technique for the characterization of materials, particularly those to be applied as scintillators/radiation detectors. A serious concern when performing IBIL experiments however, is the potential chemical and microstructural changes occurring in the materials as a function of radiation damage. It is often observed that the overall intensity of IBIL emissions decrease with increasing dose, in addition to a less common observation of emission peaks shifting. It is crucial to understand if these observations are the result of chemical changes in the material, microstructural changes, or ion-induced ablation. In situ ion irradiation/SEM imaging experiments have been carried out to aid in determining the mechanism(s) behind these phenomena. Materials studied include Y_2SiO_5:Ce, $Y_3Al_5O_{12}$:Ce, Y_2O_3:Eu, GaN, and $PbWO_4$. In addition to IBIL spectra and radiation damage curves, SEM images and microstructual analyses will be presented to elucidate the mechanisms behind IBIL damage in various materials.