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Optical and thermoluminescence properties of lithium potassium borate glasses doped with Eu^{3} ions

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We have reported the dosimetric properties of lithium potassium borate (LKB) doped with different concentrations of Eu3+ ions.The current glasses have been produced by melting the chemical mixtures of Li_2CO_3, B_2O_3 and K_2CO_3 at 1100oC and then quenched to room temperature. The samples are characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM) and diffraction thermal analysis (DTA). The luminescence spectra show four characteristic bands at 590, 613, 650 and 698 nm, which attributed to $^5D_0 \rightarrow {}^7F_1$(yellow), $^5D_0 \rightarrow {}^7F^2$(orange), $^5D_0 \rightarrow {}^7F^3$(red) and $^5D_0 \rightarrow {}^7F^4$(red) transitions of trivalent Eu^{3+} ions. The glow curve for undoped LKB sample was observed at 180°C. The Eu^{3+}-doped sample show prominent TL glow peaks at 220°C when heated at a constant heating rate of 5°C.s[1]. The proposed dosimeter shows a well-defined glow curve, good linearity, good effective atomic number and minimal fading response.

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Studies on high temperature sensor upto 1000ºC based on thermally regenerated fiber Bragg gratings

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This paper presents the studies on high reflectivity thermally regenerated fiber Bragg grating (FBG) in hydrogen loaded photosensitive opticalfibers. The effect of Ge and Ge-B co-doping in fused silica fibers on the reflectivity of thermally regenerated gratings and the residual reflectivity of regenerated fiber Bragg gratings at elevated temperature upto 1100ºC, are presented. Type-I FBGs of almost similar transmission loss/reflectivity (~ 35 dB) were inscribed as the seed gratingin the core of various H_2 loaded fused silica fibers having different molar doping concentrations of only Ge and B-Ge. The FBG inscription is carried out using 255 nmUV source atrepetition rate of 5.6 kHz.The seed type I FBGs were subjected to multi-step annealing process upto 1100ºC spanning over 60 hours for studying thermal regeneration characteristics andtemperature sustainability. Two regeneration regimes were observed for FBGs written in Ge doped fiber whereas single thermal regeneration was observed for Ge-B co-doped fiber. At 1100ºC, the residual reflectivityof 0.1% (for Ge-B co-doped fiber), 40% (for 3% Ge doping), 43% (for 10% Ge doping) and 10% (for 18% Ge doping) were obtained. The residual reflectivity is linked with the structural modification of the grating which is experimentally confirmed from the dc refractive index change during regeneration of the FBG. Structural transformation in fused silica fiber due to annealing at high temperature (1100ºC) is also confirmed by Synchrotron X-ray diffraction measurement of un-annealed and annealed fibers.

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