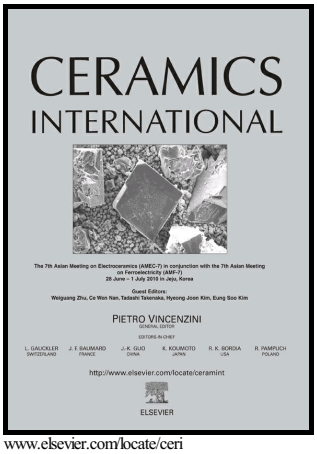

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Spectroscopic analysis of up conversion luminescence in doped halogeno-antimonite glass

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Abstract

The up-conversion emission of Nd^{3+}, Sm^{3+} and Er^{3+} has been studied in a new halogeno-antimonite glass with the chemical composition 80 Sb_2O_3 - 10 $ZnBr_2$ - 10 KCl. Doping concentration was 0.2 mol% of lanthanide (Ln) ions. Rare earths were introduced as fluorides LnF_3 that were further converted into oxides. Main physical properties of base glass were measured, including density, thermal expansion, characteristic temperatures, refractive index and optical transmission. The amount of residual hydroxyls was calculated from the OH absorption band around 3000 nm. The recorded up-conversion emission lines are λ_{em} = 536 nm for Nd^{3+} pumped at 805 nm; λ_{em} = 563 nm, 600 nm, 631 nm and 645 nm for Sm^{3+} pumped at 945 nm; λ_{em} = 531 nm for Er^{3+} pumped at 798 nm. Co-doped glass (0.1 Yb^{3+} + 0.1 Er^{3+}) pumped at 980 nm has three emission lines at 524 nm, 545 nm and 650 nm. Corresponding transitions have been identified and the mechanisms ruling the up-conversion process is discussed. They include excited state absorption (ESA), energy transfer (ET) cooperative energy transfer (CET), emission assisted by phonon (EAP), multiphonon relaxation (MR) and cross- relaxation (CR).

Key words: Melt-quenching; doped glass; low phonon energy; HMOGs Glasses; Up-Conversion Luminescence