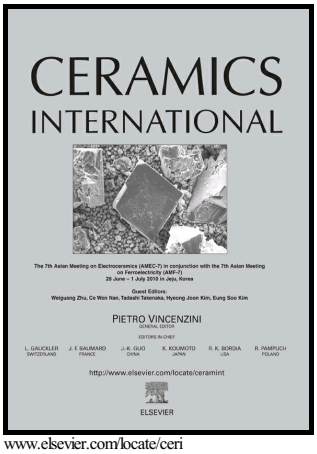

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Influence of Er doping on the structural, optical and luminescence properties of pulsed laser deposited Er: $BaZrO_3$ thin films

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ABSTRACT

Pure and erbium doped (1, 2, 3 and 5 at. %) Barium zirconate (BZE) thin films have been deposited on Si (0 0 1) substrate via pulsed laser deposition using100 mJ Nd: YAG laser operated at second harmonics (532 nm). Er doping significantly affects the surface morphology, microstructure and optical properties of grown thin films. All the films exhibit cubic $BaZrO_3$ structure and are polycrystalline in nature as extracted from XRD data. The optical band gap energies (3.75- 3.63 eV) of doped (1, 2, 3, and 5 at. %) BZE thin films are found to be less than that of pure BZO film (4.03eV). PL spectra, excited at 328 nm, mainly consist of violet-blue (412 nm) and green (523–543 nm) emissions for all the doped films. The green emission increases with the increase in Er doping upto 3 at. % and then concentration quenching effect appears at 5 at. %. It is noted that the relative intensity of PL emission and the optical band gap can be tuned by varying Er concentration to alter the properties of the phosphor. The emission peaks in photoluminescence spectra makes the Er: BZO films potential candidates to be used in optoelectronic devices such as light emitting diodes (LEDs).

Keywords: $BaZr_{1-x}Er_xO_3$ thin films, doping, PLD, Photoluminescence, Perovskite oxide.