Scintillating properties of Pr3+ doped BaY2F8.

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Scintillators are luminescent materials absorbs radiation and converts the energy of radiation into visible light. Barium Yttrium Fluoride (BaY2F8 -BaYF), when doped with trivalent rare earth ions, is a scintillator with a quite high conversion efficiency. The spectrum of the emitted light in these materials usually extends from near UV to near IR with well defined emission peaks characteristics of the rare earth dopant ion. The main structural and optical properties of BaY2F8 doped with percent 2 mol of praseodymium (Pr3+) were studied in this work. Two types of samples were studied, both as powders: polycrystalline samples, obtained via solid state reaction of BaF2 and YF3 under HF atmosphere, and single crystals, obtained via the zone melting method also in a HF atmosphere. Structural analysis of the samples was performed by powder X-ray diffraction and the results showed the presence of the BaY2F8 phase. Using the Radioluminescence (RL) technique, with excitation by CuK alpha X-rays, it was possible to obtain the emission spectrum of the samples. The RL spectra showed emission peaks in energies that are characteristics of Pr3+ extending from approximately 230 to 730nm, with a maximum emission peak at 610nm, in the orange region of the visible spectrum. Both samples showed a phosphorescent decay time of the order of seconds. The RL intensity of the single crystal samples is higher throughout the entire spectral range than the intensity of the RL signal of the polycrystalline samples. The samples also exhibited a change in colour due to irradiation and the radiation damage was evaluated by the optical absorption techniques and the defects generated by radiation were followed using thermoluminescence (TL) techiniques. The results are related to the effect of cumulative dose of radiation on the intensity of the RL yield. (Work supported by FAPITEC/SE, CNEN and CNPq)