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OPTICAL AND SPECTROSCOPIC PROPERTIES OF THE SM2O3–DOPED CABTE GLASSES

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The tellurite glasses form an important class of glassy matrices, due to its low glass transition temperature (Tg), thermal stability and good rare earth ions solubility, low phonon energy, high refractive index, and suitability as host matrix to dopant action. The tellurite glass is an optical material with wide photonic applications, such as nonlinear optics and optical amplifiers. The addition of other glass-former in tellurite glasses, such as boron oxide (B2O3), results in a better chemistry stability. Moreover, the addition of finisher agents as calcium fluorite (CaF2) and glass modifiers as calcium oxide (CaO) are also promising, since the CaF2 decrease the phonon energy and remove bubbles formed during glass synthesis process and the CaO improve rare earth ion doping, due to the substitution of the Ca2+ ions for dopant ions. The samarium ion (Sm3+) is one of the most researched trivalent ion, due to important photoluminescence properties. The ion presents different emission levels and has low influence of the host glassy matrix, due to the larger difference of energy (~7000 cm-1) between excited level (4G5/2) and more near fundamental level (6F11/2). The ion presents four emissions 561, 600, 644 e 707 nm correspondents to levels transitions 4G5/2?6H5/2, 6H7/2, 6H9/2 e 6H11/2, respectively. In this context, the aim of the study is the synthesis and characterization of calcium borotellurite glasses Sm2O3 doped, in order to investigate your optical and spectroscopic properties as a function TeO2 content. The system studied in this research is CaF2 – CaO – B2O3 – TeO2 – Sm2O3. The TeO2 content varied from 20% to 70 % and the Sm2O3 doping was fixed in 0.25 mol%. Five samples were prepared by melt-quenching method and thermally annealed to release its inner stress. Lastly, the samples were optically polished and characterized by density (Arquimedes method), refractive index, optical absorption, luminescence, temperature-dependent luminescence and lifetime. The increase of TeO2 content increases the volumetric density and refractive index. The optical absorption spectra present the various absorption peaks of Sm3+ ions. The most intense absorption peak was observed at 402 nm (6P3/2 level). The luminescence presents reduction with increase TeO2 concentration. The temperature-dependent luminescence results in a decreasing emission intensity with the temperature increase (300 to 480 K). The lifetime at 600 nm decreases due to the reduction of the interionic distance between Sm3+ ions. In conclusion, the calcium borotellurite glasses Sm2O3doped present good optical and spectroscopic properties. Thus, these materials are good candidates for application in photonic devices, such as solid state lasers, temperature sensors, optical fibers etc.