Synthesis and characterization of germanate glasses containing niobium oxide for luminescent devices

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Rare-earth doped glass and nanocrystalline glass-ceramics are investigated as they allow to obtain materials with promising luminescent properties for application in photonic.[1,2] On this paper, GeO_2-Nb_2O_5-K_2O samples undoped and doped with Eu^{3+}, Er^{3+} e Er^{3+}/Yb^{3+} ions were obtained. Nb_2O_5 was incorporated into the glass network since vary the amount of this precursor may result in change in the luminescent properties of rare-earth.[3] Therefore, (90-x)GeO_2-xNb_2O_5-10K_2O samples were prepared aiming to find the maximum concentration of Nb_2O_5 and study the optical, thermal and structural properties. Samples were doped with Eu^{3+} ions used as structural probe, and Er^{3+} and Er^{3+}/Yb^{3+} aiming at applications in photonics. Figure 1 shows the glass obtained. Nanocrystalline glass-ceramics was obtained under suitable heat-treatment conditions. Thermal (DSC, DTA), estructural (Raman, FTIR, XRD) and optical (UV-Vis-NIR and photoluminescence) measurements were performed. In short, increasing the concentration Nb_2O_5 considerably decreases the thermal stability parameter. Samples with a maximum of 20 mol% Nb_2O_5 were obtained and are promising because they may exhibit preferential precipitation of crystals formed only by metal oxide crystalline phases. Furthermore, the samples with large amounts of Nb_2O_5 doped with rare-earth suggests the possibility of obtaining potential transparent glass-ceramics for optical application.

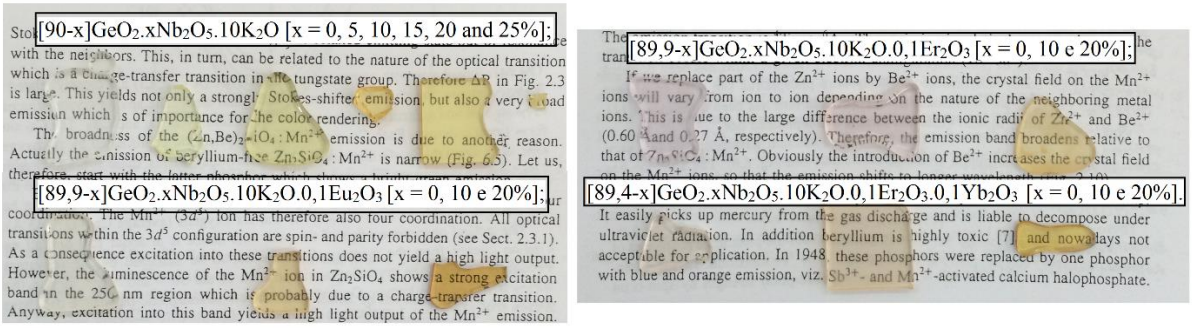

Figure 1. Glass samples: final aspect of the investigated ternary undoped and doped.

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