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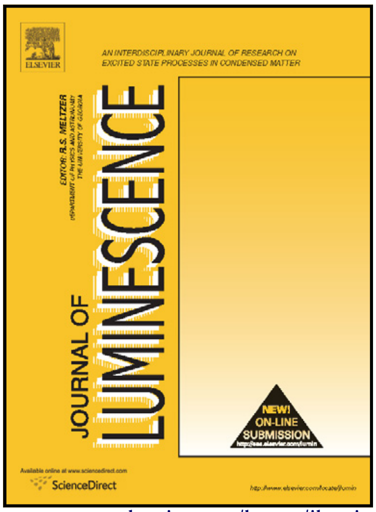

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Optical spectroscopy and optical waveguide fabrication in Eu^{3+} and Eu^{3+}/Tb^{3+} doped zinc-sodium-aluminosilicate glasses

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Optical and spectroscopic properties of 2.0% $Eu(PO_3)_3$ singly doped and 5.0% $Tb(PO_3)_3$-2.0% $Eu(PO_3)_3$ codoped zinc-sodium-aluminosilicate glasses were investigated. Reddish-orange light emission, with x = 0.64 and y = 0.36 CIE1931 chromaticity coordinates, is obtained in the europium singly doped glass excited at 393 nm. Such chromaticity coordinates are close to those (0.67,0.33) standard of the National Television System Committee for the red phosphor. When the sodium-zinc-aluminosilicate glass is co-doped with Tb^{3+} and Eu^{3+} reddish-orange light emission, with (0.61,0.37) CIE1931 chromaticity coordinates, is obtained upon Tb^{3+} excitation at 344 nm. This reddish-orange luminescence is generated mainly by $^5D_0 \rightarrow {}^7F_1$ and $^5D_0 \rightarrow {}^7F_2$ emissions of Eu^{3+}, europium being sensitized by terbium through a non-radiative energy transfer. From an analysis of the Tb^{3+} emission decay curves it is inferred that the $Tb^{3+} \rightarrow Eu^{3+}$ energy transfer might take place between Tb^{3+} and Eu^{3+} clusters through a short-range interaction mechanism, so that an electric dipole-quadrupole interaction appears to be the most probable transfer mechanism. The efficiency of this energy transfer is about 62% upon excitation at 344 nm. In the singly doped and codoped glasses multimode optical waveguides were successfully produced by Ag^+-Na^+ ion exchange, and they could be characterized at various wavelengths.