Eu^{2+} to Mn^{2+} energy transfer in the UV-LED phosphor $(Ca,Eu,Mn)_{10}(PO_4)_6Cl_2$

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The well-known halophosphate family of phosphors has been modified for use in UV-LEDs by utilizing the Eu^{2+}-Mn^{2+} energy transfer couple. Optimization of the efficiency and color of these materials requires fundamental understanding of the energy transfer processes between Eu^{2+} and Mn^{2+}. In this paper, we will delineate the energy transfer processes in $(Ca,Eu,Mn)_{10}(PO_4)_6Cl_2$ by studying the steady-state (Figure 1) and time resolved luminescence processes as a function of composition and temperature. These results will be analyzed using known models for energy transfer to determine the microscopic mechanisms in this system.

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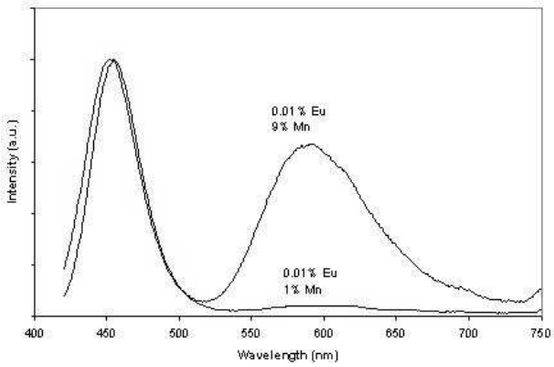

Figure 1. Room temperature emission spectra of $Ca_{10}(PO_4)_6Cl_2$:Eu^{2+},Mn^{2+} (λ_{ex}=405 nm) for varying Mn^{2+} concentrations.