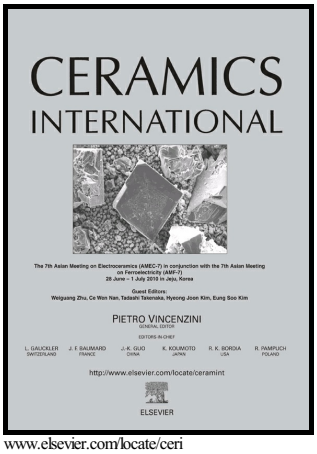

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Improved photoluminescence, thermal stability and temperature sensing performances of K^+ incorporated perovskite $BaTiO_3:Eu^{3+}$ red emitting phosphors

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Abstract: K^+ ions incorporated perovskite $Ba_{(1-x)}TiO_3$:x Eu^{3+} red emitting phosphors synthesized via facile solid -state reaction method has been investigated in the current study. The photoluminescence and decay time behavior of $Ba_{(1-x-y)}TiO_3$:x Eu^{3+},yK^+ phosphors are investigated as a function of Eu^{3+}, K^+ concentration and temperature. An intense and sharp emission peak at 615nm was exhibited by the phosphors upon excitation at 397nm ($^7F_0 \rightarrow {}^5L_6$). It can be credited to the hypersensitive electric dipole transition $^5D_0 \rightarrow {}^7F_2$, which confirms that Eu^{3+} ions are located at non-centrosymmetric site of the host. The incorporation of K^+ ions in optimized $Ba_{0.95}TiO_3$:0.05 Eu^{3+} phosphor resulted in a remarkable enhancement of photoluminescence intensity by 2.33 times as compared to bare one. The $Ba_{0.89}TiO_3$:0.05 Eu^{3+}, 0.06 K^+ phosphors were found to observe good temperature sensing along with adequate thermal stability even at 427 K. Furthermore, the photometric parameters have been also studied which are strongly facilitate the prepared ceramic samples as suitable for potential application in lighting.

Graphical abstract