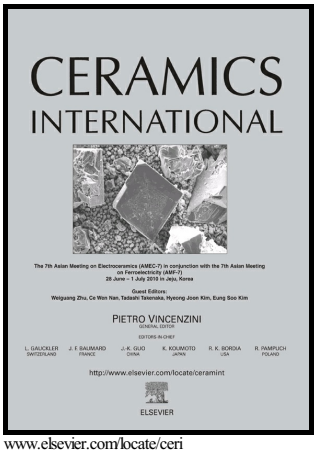

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Photoluminescence enhancement of novel K(Y,Lu)$CaWO_6$: Eu^{3+} red phosphor prepared by controllable citrate-EDTA complexing method

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Abstract:

Novel double-perovskite K($Y_{0.95-x}Lu_xEu_{0.05}$)$CaWO_6$ red phosphors were successfully prepared by the controllable citrate-EDTA complexing method. XRD with structure refinement, FTIR, Raman and photoluminescence spectra were combined to systematically investigate the structure parameters and luminescence properties of prepared phosphors. The substitution of Lu^{3+} with smaller ionic radius resulted in the lower symmetry even with the same space group of *C2/m*, which was also directly observed from the red shift and splitting of Raman T_{2g}(1) mode. The concentration higher than x=0.6 made the intensity alteration in the excitation spectra from charge transfer band to 4*f*-4*f* of Eu^{3+}. The obvious enhancements of red emission at 615 nm were obtained under both blue and ultraviolet lights, respectively, and reached almost the same intensity at x=0.6. Meanwhile, the more standard red light could be found by the gradual shifts of CIE chromaticity coordinates and bigger ratio of red/orange emission. The substitution of Lu^{3+} improved the quality and emission intensity of red light of this double perovskite system and the composition optimized phosphor of K($Y_{0.35}Lu_{0.6}Eu_{0.05}$)$CaWO_6$ exhibited great potential in the application of white LEDs.

Keywords: Double perovskite; controllable citrate-EDTA complexing method; symmetry; phosphors; white LEDs