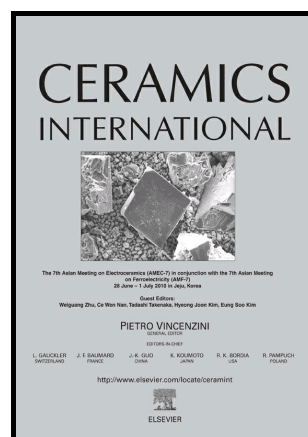


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Luminescence properties of $\text{AgTb}(\text{WO}_4)_2$ doped with Ce^{3+} :**Experimental determination of the Stern-Volmer quenching constant**

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ABSTRACT:

Scheelite-like $\text{AgTb}(\text{WO}_4)_2$ doped Ce^{3+} were synthesized by ceramic method. Efficient characteristic bands of Tb^{3+} were observed in $\text{AgTb}(\text{WO}_4)_2$ compounds. However, the presence of Ce^{3+} quenched the emission band of Tb^{3+} which can be caused by metal-to-metal charge transfer between $\text{Tb}^{3+}/\text{Ce}^{3+}$. The quenching is more efficient at high temperature which can be attributed to more overlaps of wave functions of $\text{Ce}^{3+}-\text{W}^{6+}-\text{Tb}^{3+}$ at high temperature. The experimental Stern-Volmer quenching rate constant at room temperature and liquid nitrogen temperature were measured as $(376\pm 4)\cdot 10^{-3} \mu\text{s}^{-1} (\text{x content/mol})^{-1}$ and $(45\pm 4)\cdot 10^{-3} \mu\text{s}^{-1} (\text{x content/mol})^{-1}$ respectively. In excitation spectra, evident blue shift of charge transfer band in the case of liquid nitrogen temperature was observed. In addition, the blue shift of CT band also occurred with increasing concentration of Ce^{3+} . The shifting of charge transfer band can be interesting to the design of solar cells and tunable excitation sources and detectors.

Keywords: Stern Volmer; $\text{AgTb}(\text{WO}_4)_2$; Ce^{3+} ; Scheelite.

1. INTRODUCTION

In recent years, luminescent materials based on rare earth ions have been applied to photovoltaic devices as spectral converters to exceed the Shockley - Queisser limit for single-junction crystalline silicon (c-Si) solar cells. It was reported that the energy loss in the conversion of solar energy to electric energy is mainly due to the intrinsic spectral mismatch: low-energy photons cannot be absorbed by the solar cells (sub-bandgap transmission loss) while high-energy photons cannot be used efficiently (lattice thermalization loss).[1-4] A potential way to reduce the spectra mismatch losses is to adapt the solar spectrum to match the solar cell better. Hence shifting the incident solar spectrum through down-conversion and up-conversion of luminescent materials could improve

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