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Luminescence properties of novel $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{MoO}_4)_8:\text{RE}^{3+}$ ($\text{RE} = \text{Pr}^{3+}, \text{Sm}^{3+}$) red phosphors

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Abstract: A series of $\text{Li}_3\text{Ba}_2\text{Gd}_{3-x}\text{Pr}_x(\text{MoO}_4)_8$ and $\text{Li}_3\text{Ba}_2\text{Gd}_{3-x}\text{Sm}_x(\text{MoO}_4)_8$ red phosphors were synthesized by conventional solid state reaction method. For 7 mol % of Pr^{3+} and for 8 mol% of Sm^{3+} concentration, the phosphors exhibit a strong excitation peak at 450 nm (blue light) and 401 nm (near UV) indicating an intense absorption. The PL emission spectra of $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{MoO}_4)_8:\text{Pr}^{3+}$ and $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{MoO}_4)_8:\text{Sm}^{3+}$ phosphors showed an intense peak at 645 nm (red) which corresponds to ${}^3\text{P}_0 \rightarrow {}^3\text{F}_2$ transition of Pr^{3+} and at 604 nm (red) which corresponds to ${}^4\text{G}_{5/2} \rightarrow {}^6\text{H}_{7/2}$ transition of Sm^{3+} . Our results indicate that $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{MoO}_4)_8$ is a potential host material for Pr^{3+} and Sm^{3+} and $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{MoO}_4):\text{RE}^{3+}$ ($\text{RE}^{3+} = \text{Pr}^{3+}, \text{Sm}^{3+}$) is capable of converting the blue /near UV emission of a light-emitting diode into red light.

Keywords : Phosphors, photoluminescence, solid state reaction method, red light.

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