

Analysis on addition of novel Sm^{3+} in replacing Eu^{3+} in $\text{LiEu}_{(0.45-x)}\text{Gd}_{0.55}(\text{MoO}_4)_2$ phosphor

Abstract

Europium is amongst the most critical and expensive rare earths due to its luminescence properties for red element in displays and lighting technology. As the market demand of Europium is now at scarce, this paper tried minimize the use of Europium. In the mean time, Samarium (Sm^{3+}) has been of interests as it can contribute in the red/orange emitting activator but researches of Sm^{3+} potentials in replacing Eu^{3+} was hardly found. In this article, a series of red phosphors $\text{LiEu}_{(0.55-x)}\text{Gd}_{0.45}(\text{MoO}_4)_2\text{Sm}_x$ were synthesised using solid-state reaction and an XRD analysis conducted confirmed that the structure of the compounds to remain as tetragonal scheelite structure. Results showed that 0.10 mol of Sm^{3+} can increase the luminescence intensity and the overlaid patterns show that there are no additional peaks occurred in the increasing of Sm^{3+} to the compound which confirm that the structure remained tetragonal scheelite structure with space group $I4_1/a$. This finding has opened an opportunity for industries and researchers to use Sm^{3+} in reducing the cost of consuming Eu^{3+} in lighting technologies.

Keywords

Crystal structure; $\text{LiEu}(\text{MoO}_4)_2$; Molybdate; Red phosphor; Samarium