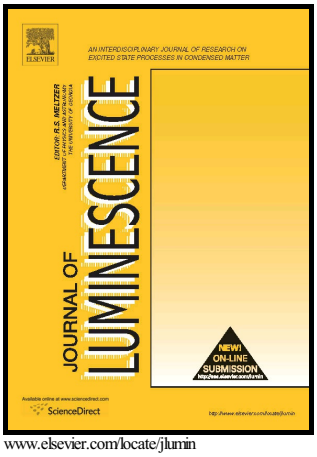


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# The synthesis and photoluminescence properties investigation of a versatile phosphor $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$: $Sb^{3+}/Eu^{3+}/Pr^{3+}/Dy^{3+}$

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## Abstract

A series of versatile phosphors $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$:$Sb^{3+}/Eu^{3+}/Pr^{3+}/Dy^{3+}$ were firstly synthesized by solid-state method. The phase purity was analyzed through X-ray diffraction and their characteristic luminescence properties were investigated. The results showed that $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$:$Sb^{3+}$ exhibited broad blue emission centered at 459 and 467 nm, due to the selective excitation transitions ($^3P_{1/0}\rightarrow{}^1S_0$ ) of $Sb^{3+}$ occupying different crystal sites in $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$. The emission spectrum of $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$: $Eu^{3+}$ consisted of a series of lines attributed to the $^5D_0\rightarrow{}^7F_J$ (J = 1, 2, 3, 4) transitions of $Eu^{3+}$. Moreover, an unusual blue emission band was observed, which was discussed in detail and proved to be related to the vacancy of $Sr^{2+}$ through the charge compensation mechanism. In addition, red and warm white emissions could be obtained from $Pr^{3+}$ and $Dy^{3+}$ single doped $Sr_{10}[(PO_4)_{5.5}(BO_4)_{0.5}](BO_2)$ and their luminescence properties were discussed, respectively.

Keywords: A. optical materials; D. optical properties; D. luminescence



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## 1. Introduction