Photoionization of Eu^{2+} in BAM

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One of the most popular blue phosphors for fluorescent lighting application is the aluminate $BaMg_2Al_{16}O_{27}:Eu^{2+}$ ($BAM:Eu^{2+}$). The popularity is based on a peak emission of 450 nm, luminescence efficiency of 20 lm W^{-1}, and good lumen maintenance. While this system has been studied most intensively, here we report for the first time on experiments to locate the ionization threshold of Eu^{2+}, i.e. the location of the Eu^{2+} groundstate relative to the host conduction band. Photoconductivity is a relative simple technique to measure the ionization threshold, although the conductivity in doped insulators is, by definition, very small /1/. If the sample, as in the case of BAM, is available in form of microcrystalline powders only, the signals are often too weak to provide accurate results, although in some systems good results have been obtained /2/. Here we report on an alternative technique to find the ionization of Eu^{2+} in BAM, based on thermally stimulated luminescence. In this technique, that can be labeled Thermally Stimulated Luminescence Excitation Spectroscopy (TSLES) /3/, tunable radiation is used to find the threshold of trap filling, which is equivalent to either the photoionization or charge transfer energy of the impurity ion.

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/3/ J. Fleniken, J. Wang, J. Grimm, M.J. Weber, and U. Happek*; Thermally stimulated luminescence excitation spectroscopy (TSLES): A versatile technique to study electron transfer processes in solids*. Journal of Luminescence (2001), in press.