Information Technologies 2004
Conference SPIE
3-7 May 2004, Chisinau, Moldova
Proceedings volume 5822,

Photoluminescence of Eu-doped ZnO structures

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https://doi.org/10.1117/12.612229

Abstract

ZnO-based red phosphors were prepared by different methods. One phosphor was grown from a Na2B4O7 melt, and another one was prepared from a ZnO:Eu2O3 powder via electron beam treatment. The e-beam processing is found to result in the formation of a high quality layer on the surface of ZnO:Eu2O3 powder. The analysis of the emission related to the Eu3+ 4f-4f intrashell transitions suggests that the phosphor grown from the Na2B4O7 melt represents a nanocomposite consisting of ZnO and Na2B4O7 nanoparticles, a part of Eu3+ ions being incorporated into ZnO and another part into Na2B4O7 constituent, while in the phosphor prepared from ZnO:Eu2O3 powder Eu3+ ions are selectively incorporated into the Zn sublattice of the ZnO host.