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BOOK of ABSTRACTS

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AlN Based Composite – White Light Emitter

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At present after intensive withdrawal of incandescent lamps from usage the main lighting elements available for users are luminescent lamps (LL) and light emitting diodes (LEDs). Therefore, a development of advanced light sources and elaboration of new prospective luminescent materials is actual.

The aim of this study is elaboration of composite material based on mixture of pure and doped AlN nano-powders inserted into the polymethyl methacrylate (PMMA) matrix emitting white light under UV irradiation within a spectral range 250-280 nm including 254 nm line of Hg emission used in the LL.

AlN powders with average grain size of 60 nm produced from raw material and doped with Mn or Tb ions were used. Photoluminescence and excitation spectra of AlN, AlN:Mn, AlN:Tb nanopowders and PMMA material were studied. It was observed that under the 250 – 270 nm UV light excitation the AlN nanopowder emits blue light (480 nm), AlN:Mn – red light (600 nm), AlN:Tb – green light (550 nm), but the PMMA emits a blue light around 400 nm. It allows production of the white light emitter by mixing the nanopowders at definite concentrations of single components.

Luminescence spectrum of final resulting composite material is shown in Fig. 1. It is seen that within the spectral range detectable by human eye the composite material emits white light with spectrum being close to that of the Sun emission.

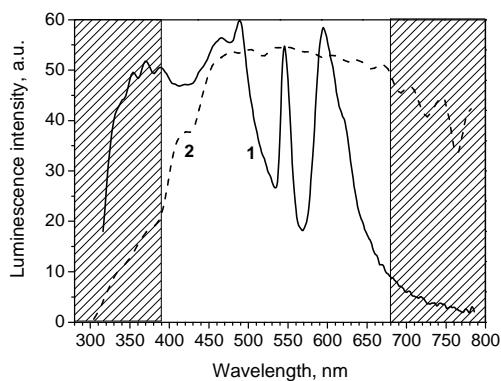


Fig.1. Luminescence spectrum under 263 nm UV excitation of AlN based composite material (1) and the Sun emission spectrum at sea level (2). The white square demonstrates a spectral region detectable for human eye.