

THE EFFECT OF NEEDLE DIAMETER ON OPTICAL PROPERTIES AND MORPHOLOGICAL STRUCTURE OF La_2O_3 -PVA PHOSPHOR NANOFIBERS USING ELECTROSPINNING METHOD

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ABSTRACT- The aim of the present study is to investigate the effect of needle diameter on the optical properties and morphological structure from the resulting electrospun La_2O_3 -PVA nanofiber. The nanofibers was formed by an electrospinning process and the average nanofiber diameter has been evaluated for five different needle diameters. The resulting nanofibers were observed and analyzed by X-ray diffraction (XRD), Field Emission Scanning Electron Microscope (FESEM), Ultraviolet-visible Spectroscopy (UV-Vis) and HPC-2 Lightsource Colorimeter. The La_2O_3 -PVA nanofibers used light down-conversion of UV light (365 nm) for the white light-emitting diode (WLED). The chromaticity coordinates (CIE) and correlated color temperature (CCT) were measured for different nanofibers with different size of needle diameter (0.45, 0.55, 0.65, 0.75, 1.1) mm. The nanofibers formed by needle diameter of 0.75 mm places macromolecule in a better order; this size of needle provides ability to control macromolecule orientation in a nanofiber. The absorbance of 0.75 mm nanofiber before annealing is 0.148au, and after annealing process it increases to 0.215au while the transmittance decreases from 72.12%T to 60.90%T. This shows that the 0.75 mm needle diameter nanofibers absorb more light after annealing process, resulting in reduction of transmittance value. An optimum color rendering index (CRI) value of 68.90 is obtained. The white phosphor exhibited CIE values of 0.3286, 0.3708 and CCT of 5618 K.

Keywords: La_2O_3 -PVA, nanofibers, Uv-vis, XRD, white light.