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INVESTIGATION ON FACILE SYNTHESIS OF YAG:Ce NANOCERAMIC POWDER PREPARED WITH MICROWAVE SOLUTION COMBUSTION AND APPLICATION IN WHITE LIGHT EMISSION

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ABSTRACT- Cerium doped yttrium aluminum garnet (YAG:Ce) phosphor was widely used as color converter in white light emitting diode (wLED). Such phosphor was commonly synthesized with high temperature solid-state reaction. However, powder derived from this method exhibited irregular and highly agglomerate particles. A repeated milling process to break the particles will cause additional defects formation, causing the optical properties to deteriorate. In this work, YAG doped with 0.1 mol% of cerium nanoceramic powder has been synthesized with facile mixed-fuel microwave solution combustion synthesis (MSCS). The as-synthesized powder was subjected to a post-annealing treatment to enhance the structural and optical properties. HR-XRD revealed an increased in crystallinity as well as crystallite size for the annealed powder. Moreover, FESEM analysis showed spherical-like nanoparticles morphology. For optical properties, broad yellow emission centered at 534 nm was demonstrated with PL measurement. Finally, the YAG:Ce phosphors was fabricated into wLED and characterized with electroluminescence (EL) measurement to determine the color properties (CIE, CCT and CRI).

Keywords: Microwave combustion, Phosphor, YAG:Ce, White light, Light emitting diode, Annealing.