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The effects of substrate temperature on the structure, morphology and photoluminescence properties of pulsed laser deposited Y3 (Al, Ga)5O12:Ce3+ nano thin films.

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Abstract content
   (Max 300 words)

LEDs have shown the potential to replace incandescent and fluorescent lamps as source of lighting. Recently, Ce3+-doped garnet phosphors such as Y3(Al,Ga)5O12:Ce3+are attracting attention in the application for white LEDs. The Ce3+ ion is responsible for nanosecond decay time and an intense yellow-green emission wavelength from its characteristic d-f transitions. Thin films offer several advantages due to their good luminescence characteristics and good adhesion to the substrate. The substrate temperature plays a critical role in the growth of the films during Pulsed laser deposition (PLD). The movement and interaction on the surface of the substrate of different particles that makes up the plume is mainly determined by substrate temperature and the energy of these deposited particles. Research on the influence of substrate temperature on Y3(Al,Ga)5O12:Ce3+ thin films is of great importance to establish the optimum substrate temperature range for high Photoluminescence (PL) intensity. this paper reports the effects of substrate temperature on luminescence and morphological properties of Y3(Al,Ga)5O12:Ce3+ thin films prepared by PLD with the variation of substrate temperature from 22℃ to 500℃ in vacuum, O2 and Ar gas background atmosphere. The X-ray diffraction spectra indicated Y3(Al,Ga)5O12:Ce3+ phosphor films are successfully grown using PLD. Atomic force microscopy revealed poorly defined grain growth for films ablated at substrate temperature of 22℃, 100℃ and 500℃ but well defined grain growth was observed for 300℃ substrate temperature. Cross section measurement done with Nano Scanning Auger Microscope (SAM) indicated film thickness to be between 90 nm to 300 nm. NanoSAM maps showed homogeneous distribution of elements on the surface of the film deposited at 300℃. PL data revealed an optimum substrate temperature of 300℃ for high PL intensity films and emission spectra of the films blue-shifted compared to the emission spectrum of the powder due to crystal field effect.

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yes

Level for award
 (Hons, MSc,
   PhD)?

MSc

Main supervisor (name and email)
and his / her institution

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Would you like to
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Yes

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