Contribution ID: **213** Type: **Poster Presentation**

Optical properties of SrGa₂S₄:Ce³⁺ films prepared by pulsed reactive cross laser beam ablation method (PRCLA)

Wednesday, 13 July 2011 17:00 (2 hours)

<p>SrGa₂S₄:Ce<sup>

3+</sup> thin films are promising for full colour thin-film electroluminescent (EL) and field emission displays (FED's) because of its good optical properties. These films were previously prepared using several different techniques such as sputtering (RF), molecular beam epitaxy (MBE), reactive multi-source deposition (MSD), metal-organic chemical vapour deposition (MOCVD), deposition from binary vapours (DBV) and Pulsed Laser Deposition (PLD). In the present study, Ce doped SrGa₂S₄ thin films were prepared for the first time using pulsed reactive cross laser ablation (PRCLA) technique. Characterization of the films was carried out with scanning electron microscopy (SEM), atomic force microscopy (AFM) and x-ray diffraction (XRD). Cathodoluminescence (CL) and photoluminescence (PL) measurements were taken with a S2000 Ocean Optics Spectrometer and a Varian Cary Eclipse Fluorescence Spectrophotometer respectively. The substrate temperature, number of pulses and the working pressure are the parameters that were varied during the preparation of the thin films. A single-phase SrGa₂S₄ layer with high crystallinity was obtained at the growth temperature of 400^oC. XRD patterns also showed that the properties of the films are relatively sensitive to substrate temperature. PL showed one broad band that can fit two Gaussian peaks according to the two Ce³⁺ emission peaks which are known to originate from radiative transitions from 5d (T_{2g}) → 4f (²F_{5/2}) and from 5d (T_{2g}) → 4f ((²F_{7/2}) respectively. CL showed two broad emission peaks around 441nm and 478nm which are due to Ce³⁺ transitions. The AFM images of the films prepared had a rough surface, which became smooth after annealing in vacuum at 700^oC temperature. Non-uniformity in particles of the films and rough surface were observed from the SEM images.

Level (Hons, MSc,
   PhD, other)?

MSc.

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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Session Classification: Poster1

Track Classification: Track A - Condensed Matter Physics and Material Science