environmental pressure. Using pressures below 100 mbar improved the morphology of transferred pixels considerably. Pixels were transferred across a range of gaps from 40 to 5 m, with the pixel morphology improving as the gap decreased. Tri-colour PLED pixels based on PFO have been fabricated using reduced pressures and small gaps. The PFO can be doped with metal complexes to emit red and green light, generating three different colours with roughly the same system with roughly the same system. The three PLEDs were transferred separately onto the same receiver substrate, and then illuminated at the same voltage.

12:15 OTU-111

Efficient Photoluminescence from single a-Si NPs:Er nanolayers prepared by pulsed laser deposition

Johann Toudert, Pablo Manuel Roque, Francisco Valle-Brozas, Rosalia Serna
CSIC, Spain

The doping of a dielectric host with nanoparticles(NPs) and active ions is desirable for the fabrication of multifunctional materials. For instance, by including Si NPs of controlled size in a dielectric matrix it is possible to tune the optical absorption of the material through the ultraviolet and visible ranges, as required for the design of optimized thin film-based solar cells. Si NPs are also sensitizers for the optical excitation of Er^{3+} ions that display photoluminescence (PL) at 1.54 micron. In this case, in addition to control the properties of the Si NPs it is necessary to control in the nanoscale the Si NPs-Er separation in order to optimize the energy transfer that leads to an enhanced PL suitable for the development of integrated gain devices. Recently we have shown that in multilayer nanostructured Si NPs:Er:Al2O3 doped films, efficient energy transfer from amorphous Si NPs to Er ions can be achieved when contact between the two dopants is achieved.[1] This unique contact feature has been realized by preparing the nanostructured films by alternate and independent pulsed laser deposition (PLD) of the different film components (Si, Er and Al_2O_3) in vacuum at room temperature. Further PL enhancement requires addressing the role of the Si NPs size and density of the a-Si NPs/Er doped nanolayers. In this work we study the PL enhancement as a function of the nanostructural properties in one single Si NPs layer. It is shown how the PL performance varies as a function of the amount of deposited Si, Si NPs and coverage which are obtained from optical measurements.

[1] S. Nunez-Sanchez et al., Appl. Phys. Lett. Appl. Phys. Lett. 98, 151109 (2011)