ABSTRACT

Energy efficient lighting is a large emerging market as conventional incandescent light bulbs are being phased out and replaced with more efficient fluorescent or light emitting devices. One of great challenges is the higher manufacturing costs of these new devices. The material of choice for light-emitting diode (LED) lighting is gallium nitride (GaN). One important practical goal is realizing such devices on large affordable substrates. Currently the majority of GaN based LEDs are grown on expensive single crystal Al2O3 wafers. Thus alternative cheap substrate has to be found or buffer layer has to be fabricated in order to bring the price LED down. Here, we were able to bring closer the crystal mismatch between GaN and buffer layer by varying the different growth parameters and concentration of doping materials.

We have grown ZnO buffer layers by using spray pyrolysis on glass substrate and doped Mo and W during the growth. Obtained buffer layers have been characterized with different tools such as x-ray diffraction (XRD), atomic force microscopy (AFM), and scanning electron microscopy (SEM) and x-ray spectroscopy (XPS).

*** Thesis title:** Highly oriented buffer layers for GaN thin films

*** Your name:** Dr. Askar Syrlybekov

*** Your public e-mail:** askar.syrlybekov@nu.edu.kz

*** Your home institute address:** No 53 Kabanbay Batyr ave, National Laboratory Astana, Nazarbayev University, Astana, Kazakhstan.

*** Your host institute address:** School of Physics, Trinity College Dublin, College Green, Dublin 2, Ireland.