

Nanoscale physics

XRD study of GaN nanowire coalescence

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GaN nanowires (NW) are a new perspective material for optoelectronic devices due to the absence of extended defects and possibility to integrate them into Si-based electronics. Also, it was shown [1], that the GaN nanowire coalescence allows to obtain porous GaN layers on Si substrate, promising for GaN-based sensors [2].

In this work, we study the GaN nanowire coalescence by X-ray diffraction (XRD), X-ray reflectometry (XRR) and scanning electron microscopy (SEM) techniques. The cross-sectional SEM measurements shows the thickness of transition from NW to coalescented layer, and the XRD was applied to study the depth dependence of mosaicity and strain. Additionally, the XRR was applied to study the porosity of the top GaN coalescent layers, i.e. degree of coalescence. The correlation of the results is discussed.

[1] Bo-Ra Yeom, R. Navamathavan, Ji-Hyeon Park, Yong-Ho R and Cheul-Ro Lee/ Growth behavior of GaN epilayers on Si(111) grown by GaN nanowires assisted epitaxial lateral overgrowth// CrystEngComm. –14. – pp.5558-5563. – 2012.

[2] Asmiet Ramizy, Z. Hassan, Khalid Omar/ Porous GaN on Si(1 1 1) and its application to hydrogen gas sensor// Sensors and Actuators B: Chemical. – 155. - 699–70. – 2011.