



# Microstructural Analysis with Graded and Non-Graded Indium in InGaN Solar Cell

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**Abstract**

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In this study are graded and non graded InGaN/GaN samples grown on *c*-oriented sapphire substrate using the Metal Organic Chemical Vapour Deposition (MOCVD) technique. The structural and morphological properties of the grown InGaN/GaN solar cell structures are analyzed using High Resolution X-ray Diffraction (HRXRD), atomic force microscopy (AFM). Each structures *c* and *a* lattice parameters strain, biaxial strain, hydrostatic strain, stress, lattice relax, tilt angle, mosaic crystal size, dislocation densities of GaN and InGaN layers are determined by XRD measurements. In accordance with these calculations, the effect of graded structure on the defects, are discussed. As a dramatic result; although values of full width at half maximum (FWHM) are broad, a considerable decrease at dislocations is noticed. The AFM observations have revealed that the two dimensional growth of the graded sample is more significant and its roughness value is lower. *J/V* measurements shown that the performance of the graded structure is higher. It is determined that all test results are consistent with each other.

**Keywords:** AFM; HRXRD; INGAN/GAN SOLAR CELL; MOCVD

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