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SYNTHESIS AND ELECTRICAL CHARACTERIZATION OF GaN GROWN BY ELECTROCHEMICAL DEPOSITION

ABSTRACT
The III-Nitride semiconductor materials are wide bandgap materials and can be crystalline as the structure of wurtzite and zinc-blende types. Wurtzite InN, GaN and AlN have direct bandgap 1.9 eV, 3.4 eV and 6.2 eV, respectively [1]. GaN is an extremely promising material for the blue and white light-emitting diodes LEDs, leaser and detectors [2].
İn this study GaN thin films were deposited on Si (111) substrates at room temperature using an electrochemical technique. The deposition was done by placing the Si substrate in a solution of Ga(NO3)3 and NH4NO3 in deionized water at room temperature and applying a current density of 1 mA/cm2. Good quality of Schottky diode was fabricated on the GaN thin films, with IV barrier height of 0.68 eV and CV barrier heights of 0.97 eV for GaN deposited using 1 mA/cm2 current density. Deep-level transient spectroscopy measurements were performed, and electron traps with an activation energy of 0.47 eV and 0.29 eV were observed in GaN thin film grown by the electrochemical deposition technique. A more detailed explanation for GaN will be discussed and related to the structural and morphological of a sample using the X-ray diffraction, scanning electron microscopy.

Keywords: GaN, electrochemical deposition, Schottky diodes, DLTS, characterization.

References
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[2] S.J. Pearton, C.R. Abernathy, F. Ren, Gallium Nitride Processing for Electronics, Sensors and Spintronics, Springer, London, 2006.

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