CCIT Report No. 301

Thermally Activated Electrical Conductivity in Thin GaN Epitaxial Films

J. Salzman, C. Uzan-Saguy, R. Kalish, V. Richter and B. Meyler

ABSTRACT

Temperature dependent Hall measurements of thin GaN films subjected to He ion-irradiation at ever increasing doses are used to study the electron transport in GaN. It is shown that electron transport is a thermally activated process with activation energies gradually increasing with reciprocal net carrier concentration, until a saturated value of the activation energy is reached. These experiments provide a direct verification that conductivity in thin GaN layers is controlled by potential barriers caused by depletion of grain boundaries in the material. Values of average grain size, density of surface states at the grain boundaries, and their energetics are extracted from the experiment.