CC PUB #274

April 1999

Gain Boundary Controlled Transport in GaN Layers

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Abstract

An exponential dependence of the photoconductivity on the surface photovoltage at GaN layers is predicted theoretically and confirmed experimentally. The prediction is based on the assumption that the material is mainly an ordered poly-crystal, consisting of columnar gains. Transport is therefore limited by potential barriers at the grain boundaries, arising from charge trapped at grain boundary defects. The observed exponential dependence thus provides evidence that strongly support the model by establishing a direct link between the *bulk* conductivity and the *surface* potential barrier. The same model is shown to explain successfully several other defect-related findings as well.