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Yellow Luminescence and Related Deep Levels in Unintentionally Doped GaN Films

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Abstract

The deep level energy distribution associated with the well-known “yellow luminescence” in GaN is studied by means of two complementary deep level techniques: photoluminescence and surface photovoltage spectroscopy. The combined experimental results show that the “yellow luminescence” is due to capture of conduction band electrons, or electrons from shallow donors (with a maximum depth on the order of the thermal energy) by a deep *acceptor* level with a broad energy distribution, centered at $\sim 2.2\text{eV}$ below the conduction band edge. In addition, the results show that the density of “yellow luminescence” related states possesses a significant surface component.