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Electrical characterisation of the interface in a Au \ Ni \ n -Al0.18Ga0.82N Scottky contact system

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<p>The AlxGa1-xN materials system is important for realising tuneable LED and laser sources and short wavelength photodetectors. While AlxGa1-xN (x = 0) is fairly known, there is interest in studying the effects of an increasing Al fraction on properties of devices. In particular, on the properties of a bi-metal Ni Au Schottky contact. We utilise Current-Voltage (I-V) and the forward Capacitance-Voltage (C-V) characteristics; and, Admittance (Capacitance-Frequency (C-f) and Conductance-Frequency (G-f) techniques to study the Ni Au Schottky barrier contact by monitoring the diode ideality (n), the Schottky barrier height and the density of interface states (Dit). The as deposited Ni Au Schottky contact is non- ideal with an ideality factor, n = 1.6 eV. We also observe for low forward voltages, a Recombination-Generation (R-G) component to current conduction. The forward C-V measurements reveal an anomalous peak at 0.45 V confirming the observed non-ideality. The as deposited Dit increases exponentially to about 4.5 x 1011 eV-1 cm-2 towards the mid band gap. G-f measurements reveal a broad peak around 300 kHz at room temperature, which below 240 K evolves into two peaks centred around 40 kHz and 1 MHz. Preliminary isochronal annealing in Oxygen between room temperature and 623 K indicate that the I-V characteristics improve with idealities around 1 eV and the Dit is reduced from 4.5 x 1011 eV-1 cm-2 to about 3.5 x 1010 eV-1 cm-2 in the annealed samples. Our results are consistent with a metal-oxide-semiconductor model for the annealed Ni Au Scottky contact.

Level (Hons, MSc,
   PhD, other)?

PhD

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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