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Electron Transport in Dilute Alloys of GaAs(1-x)N(x) RICHARD AHRENKIEL, JOSEPH LUTHER, STEVEN JOHNSTON, WYATT METZGER, National Renewable Energy Laboratory — Alloys of GaAs(1-x)N(x) where x $<$ 0.03 are currently very popular because of the abnormally large bowing coefficient with these dilute nitrogen concentrations. Electron transport in p-type samples is problematic due to low carrier mobilites and diffusion lengths. Our time-resolved photoluminescence measurements indicate very short recombination lifetimes; these lifetimes are far shorter than would be predicted by radiative recombination theory. Our DLTS studies of the alloy have shown strong electron trapping with an emission energy of about 0.2 eV. This trap does not show filling behavior, even with very long (10 s) filling pulses. Also, the minority carrier DLTS peak occurs without injecting, forward-bias electron pulses, indicating pair generation in the junction. Our recent temperature-dependent current voltage measurements of n-GaAs/p- GaAs(1-x)N(x) heteojunctions indicate a reverse saturation current, J_0, that is decadesof magnitude larger than found in similar doped GaAs homojunctions. Furthermore, there is a large step in J_0 at temperature above about 200 K, which increases with nitrogen concentration, x. These data can be attributed to nitrogen complexes or clusters that began to form an impurity band very low x-values. Our model of electron transport, that is compatible with the above data, will be described.

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