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Electrolyte-based capacitance voltage analysis of InN J.W. AGER III, K.M. YU, Lawrence Berkeley National Laboratory, Berkeley, CA , R.E. JONES, D.M. YAMAGUCHI, S.X. LI, Lawrence Berkeley National Laboratory and UC Berkeley, Berkeley, CA, W. WALUKIEWICZ, Lawrence Berkeley National Laboratory, Berkeley, CA, E.E. HALLER, Lawrence Berkeley National Laboratory and UC Berkeley, Berkeley, CA, H. LU, W.J. SCHAFF, Cornell University, Ithaca, NY
— The electron affinity of InN, 5.8 eV, is larger than for any other known semiconductor. As a result, InN has a surface accumulation layer of electrons reflecting pinning of the Fermi level ca. 0.9 eV above the conduction band edge. In addition, all metals form an ohmic contract to InN, so that it is not possible to measure the space charge distribution using standard capacitance voltage (CV) measurements. We show that electrolyte solutions can be used to make blocking contacts to InN and that under reverse bias conditions, the surface accumulation layer and up to ca. 10 nm of the underlying InN can be depleted. Analysis of CV data obtained under these conditions using the Poisson equation allows net charge as a function of depth to be modeled. In n-type InN, good agreement with bulk Hall effect data is obtained when the depletion region is extended to > 5 nm below the surface. In Mg-doped InN, modeling of the CV data produces evidence for ionized acceptors below a surface inversion layer.

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