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Band Gaps in InN/GaN Superlattices: Polar and Nonpolar Growth Directions NIELS CHRISTENSEN, Department of Physics and Astronomy, Aarhus University, 8000 Aarhus C, IZABELA GORCZYCA, KAMILA SKROBAS, TADEUSZ SUSKI, Institute of High Pressure Physics, UNIPRESS 01-142 Warsaw, Poland, AXEL SVANE, Department of Physics and Astronomy, Aarhus University, 8000 Aarhus C — The electronic structures of short-period superlattices (SLs) consisting of mInN/nGaN unit cells with composition (m,n) have been calculated within the density-functional theory including corrections for the "LDA gap error". The variation of the gaps with SL composition and the dependence on the growth direction, the *polar* (c) and *nonpolar* (a,m) directions in the wurtzite structure, are compared. The band gaps calculated for the polar SLs are much smaller than those found for non-polar SLs due to the electric polarization fields in the (c) SLs. For the (*1*,m) class of polar samples photoluminescence measurements yield energy-gap values, which are much larger than the calculated values. The reason for this is that the structure of the samples differs from the assumed ideal composition. Transmission electron microscopy studies of the assumed polar *1*InN/nGaN SLs show that the real structure is $1In_xGa_{1-x}N$/GaN with In-content x=0.33. New calculations for such SLs are in perfect agreement with photoluminescence experiments.

Niels Christensen
Department of Physics and Astronomy, Aarhus University,
8000 Aarhus C

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