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Modeling the optical constants of hexagonal GaN, InN, and AlN

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Optical constants of hexagonal GaN (in the range 1.5–10 eV), InN (in the range 2–10 eV), and AlN (in the range 6–20 eV) for $E \perp c$ are modeled using a modification of Adachi's model of optical properties of semiconductors. Model parameters are determined using the acceptance-probability-controlled simulated annealing method. The employed model uses an adjustable broadening function instead of the conventional Lorentzian one. The broadening can vary over a range of functions with similar kernels but different wings. Therefore, excessive absorption inherent to Lorentzian broadening due to the large wings of a Lorentz function can be reduced, yielding better agreement with experimental data. As a result, excellent agreement with experimental data is obtained; the relative rms errors for the real part of the index of refraction are below 2% for all three materials, and, for the imaginary part, below 5% for GaN and below 3% for InN and AlN. © *1999 American Institute of Physics.*

KEYWORDS and PACS

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optical constants, III-V semiconductors, simulated annealing, gallium compounds, indium compounds, aluminium compounds

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