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Optical Constants of Al$_x$Ga$_{1-x}$N: Modeling over a Wide Spectral Range

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Abstract

The optical constants of $Al_xGa_{1-x}N$ have been modeled over a wide spectral range (up to 10 eV) and for all compositions $0 \leq x \leq 1$. The employed model is the modified Adachi model for the dielectric function of hexagonal materials which utilizes an adjustable broadening function instead of the conventional Lorentzian one. The broadening function can vary over a range of functions including Lorentzian and Gaussian, enabling the model to deal with inhomogeneous broadening. Excellent agreement with the experimental data is obtained for all compositions. Obtained relative rms errors for all individual compositions are below 1.5% for the real part and below 2.5% for the imaginary part of the index of refraction.

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