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Critical point transitions of wurtzite AlN in the vacuum-ultraviolet spectral range

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The optical reflection spectra have been measured on a high-quality wurtzite aluminum nitride (AlN) single crystal with synchrotron radiation in the range of 6–16 eV at different temperatures. The energy positions of the dominant structures due to the critical point (CP) transitions have been extracted by employing Adachi's dielectric function model. By the aid of the band structure of AlN, we have assigned up to ten CP transitions in the reflection spectra. The crystal-field splitting at the center of the Brillouin zone is observed to be 110 meV. We have further revealed the temperature dependencies of these interband transitions. © 2004 American Institute of Physics.

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aluminium compounds, III-V semiconductors, wide band gap semiconductors, critical points, ultraviolet spectra, reflectivity, dielectric function, Brillouin zones, pseudopotential methods

PACS

- 78.40.Fy**
Semiconductors
- 78.20.Ci**
Optical constants (including refractive index, complex dielectric constant, absorption, reflection and transmission coefficients, emissivity)
- 77.22.Ch**
Permittivity (dielectric function)
- 71.20.Nr**
Semiconductor compounds
- 71.15.Dx**
Computational methodology (Brillouin zone sampling, iterative diagonalization, pseudopotential construction)
- 64.70.-p**
Specific phase transitions

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