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## Near-band-gap optical functions spectra and band-gap energies of GaNAs/GaAs superlattice heterostructures measured by spectroscopic ellipsometry

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The optical properties of GaAs/Ga<sub>x</sub>As<sub>1-x</sub> superlattice structures grown by metal-organic vapor-phase epitaxy are studied by variable angle-of-incidence spectroscopic ellipsometry for photon energies from 0.75 to 1.55 eV. We employ **Adachi's** critical-point composite model, and we report the direct-band-gap energy  $E_0$  and the complex index of refraction of the Ga<sub>x</sub>As<sub>1-x</sub> sublayers for  $x \leq 3.3\%$  from analysis of the ellipsometry data. We observe a strong redshift of  $E_0$  with increase in  $x$ , and a strong decrease of the  $E_0$  transition amplitude. The  $E_0$  values obtained for the superlattice structures are in good agreement with photoluminescence results, and also with previous reports from single epilayers. Structure, composition, layer thickness, and parallel and perpendicular lattice mismatch of the samples are studied by transmission electron microscopy and high-resolution x-ray diffraction investigations. © 2000 American Institute of Physics.

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ellipsometry, red shift, transmission electron microscopy, gallium arsenide, energy gap, III-V semiconductors, gallium compounds, refractive index, semiconductor superlattices, X-ray diffraction

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- 78.20.Ci**  
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