

Appl. Phys. Lett. **86**, 201905 (2005); <http://dx.doi.org/10.1063/1.1929097> (3 pages)

## Spectroscopic ellipsometry study of wurtzite InN epitaxial films on Si(111) with varied carrier concentrations

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(Received 30 August 2004; accepted 1 April 2005; published online 11 May 2005)

Spectroscopic ellipsometry (SE) has been performed to determine the optical properties of the InN epitaxial films grown by nitrogen-plasma-assisted molecular-beam epitaxy on Si (111) substrates using a double-buffer technique. In addition to SE, cross-sectional transmission electron microscopy and x-ray diffraction reveal that epitaxially grown InN epilayer is homogeneous with high crystalline quality and does not include any metallic In. SE results analyzed by the **Adachi**'s model for the dielectric function of InN show that the optical absorption edge of InN varies in the range of 0.76–0.83 eV depending on the carrier concentration, which is determined by the thickness of the AlN buffer layer.

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### KEYWORDS and PACS

#### Keywords

indium compounds, semiconductor epitaxial layers, III-V semiconductors, wide band gap semiconductors, carrier density, buffer layers, transmission electron microscopy, X-ray diffraction, dielectric function, infrared spectra, molecular beam epitaxial growth, semiconductor growth

#### PACS

- 81.05.Ea**  
III-V semiconductors
- 78.30.Fs**  
III-V and II-VI semiconductors
- 68.47.Fg**  
Semiconductor surfaces
- 78.66.Fd**  
III-V semiconductors
- 68.55.-a**  
Thin film structure and morphology
- 78.20.Ci**  
Optical constants (including refractive index, complex dielectric constant, absorption, reflection and transmission coefficients, emissivity)
- 68.37.Lp**  
Transmission electron microscopy (TEM)

### ARTICLE DATA

#### Digital Object Identifier

<http://dx.doi.org/10.1063/1.1929097>

### PUBLICATION DATA

#### ISSN

0003-6951 (print)  
1077-3118 (online)

#### Publisher

American Institute of Physics



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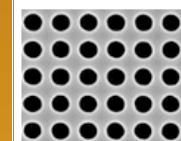
### References

- A. G. Bhuiyan, A. Hashimoto, and A. Yamamoto, *J. Appl. Phys.* **94**, 2779 (2003) and references therein.
- J. Wu, W. Walukiewicz, K. M. Yu, J. W. Ager III, E. E. Haller, H. Lu, W. J. Schaff, Y. Saito, and Y. Nanishi, *Appl. Phys. Lett.* **80**, 3967 (2002).



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K. Xu and A. Yoshikawa, *Appl. Phys. Lett.* **83**, 251 (2003).

S. Gwo, C.-L. Wu, C.-H. Shen, W.-H. Chang, T. M. Hsu, J.-S. Wang, and J.-T. Hsu, *Appl. Phys. Lett.* **84**, 3765 (2004).

T. L. Tansley and C. P. Foley, *J. Appl. Phys.* **59**, 3241 (1986).

A. B. Djuricic and E. H. Li, *J. Appl. Phys.* **85**, 2848 (1999).

A. Kasic, M. Schubert, Y. Saito, and Y. Nanishi, *Phys. Rev. B* **65**, 115206-1 (2002).

T. Kawashima, H. Yoshikawa, A. Adachi, S. Fluke, and K. Ohtsuka, *J. Appl. Phys.* **82**, 3528 (1997).

C. -L. Wu, J. -C. Wang, M. -H. Chan, T. T. Chen, and S. Gwo, *Appl. Phys. Lett.* **83**, 4530 (2003).

H. Lu, W. J. Schaff, J. Hwang, H. Wu, G. Koley, and L. F. Eastman, *Appl. Phys. Lett.* **79**, 1489 (2001).

T. V. Shubina, S. V. Ivanov, V. N. Jmerik, D. D. Solnyshkov, V. A. Vekshin, P. S. Kop'ev, A. Vasson, J. Leymarie, A. Kavokin, H. Amano, K. Shimono, A. Kasic, and B. Monemar, *Phys. Rev. Lett.* **92**, 117407 (2004).

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