Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Stability of Mg-incorporated InN surfaces: first-principles study[1]
T. AKIYAMA, K. NAKAMURA, T. ITO, Mie Univ., Japan, J. -H. SONG, A. J. FREEMAN, Northwestern Univ. — InN films are attractive materials for electronic and optelectronic applications. The growth of InN eptitaxial films with n-type and p-type conductivity has traditionally been performed along the polar <0001> direction[2], which may result in large polarization fields along the growth direction, reducing the radiative efficiency of quantum-well light emitters. To overcome this drawback, the growth along nonpolar orientation such as $(10\bar{1}0)$ and $(11\bar{2}0)$ planes and its p-type doping have been recently carried out. We have addressed this issue by performing first-principles pseudopotential calculations for Mg-incorporated InN surfaces in various orientations, including $(10\bar{1}0)$ and $(11\bar{2}0)$ as well as (0001) and $(000\bar{1})$ surfaces[3]. The calculated surface energies demonstrate that qualitative trends in the stability of Mg-incorporated surfaces agree with those on GaN surfaces [4], although several surface reconstructions different from those on GaN surfaces are obtained. The effects of growth conditions on p-type doping are also discussed.

[1]Supported by the NSF's MRSEC at N. U.
[2]R.E. Jones et al., Phys. Rev. Lett, **96**, 125505 (2006)
[3]J.-H. Song et al., Phys. Rev. Lett. **101**, 106803 (2008)
[4]J.E. Northrup, Appl. Phys. Lett. **86**, 122108 (2005)

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Date submitted: 20 Nov 2008 Electronic form version 1.4