Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Ultrahigh spatial and spectral resolution photoluminescence experiments on excitons bound to the isoelectronic nitrogen impurities in GaAs. DENIS KARAISKAJ, ANGELO MASCARENHAS, Center for Basic Science, National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, Colorado 80401, USA — Optical spectroscopy with diffraction limited resolution allows the measurement of luminescence from single impurity centers. Selectively studying individual centers makes it possible to unveil their otherwise concealed polarization anisotropy, identify their particular configuration, map their spatial distribution, and demonstrate the presence of diversity of local environments [1]. Experiments on several single nitrogen impurity pairs in GaAs allowed us to gain valuable insight into their orientation, distribution, and local environment. The nanoscale photoluminescence experiments have been combined with ultrahigh spectral resolution studies in order to better understand the optical transitions of excitons bound to nitrogen pairs in GaAs. The high spectral resolution studies have revealed a new excitonic transition originating most likely from excitons bound to two or more nitrogen impurity atoms, unprecedented since the discovery of isoelectronic impurity bound excitons in the sixties [2]. The temperature dependence demonstrates that all involved transitions originate from the same center, while the polarization dependent studies give insight into the orientation of the different nitrogen atoms in the cluster. [1] S. Francoeur, J. F. Klem, and A. Mascarenhas, Phys. Rev. Lett. **93**, 067403 (2004). [2] D. G. Thomas and J. J. Hopfield, Phys. Rev. **150**, 680 (1966).

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Date submitted: 21 Nov 2005 Electronic form version 1.4