Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

**Rate Equation Model for Carrier and Exciton Dynamics in ZnO**[1]

C. J. COOK, G. D. SANDERS, C. J. STANTON, X. WANG, Y. D. JHO, D. H. REITZE, University of Florida — There has been a renewed interest in ZnO materials for possible applications to short wavelength optical devices including blue lasers owing to its wide band-gap (3.37) and large exciton binding energy (approx. 60 meV). Recently, there have been several experimentalstudies of the dynamics of photoexcited carriers in bulk ZnO as well as epitaxial films and nanorods. In this talk, we report on theoretical calculations of the exciton and photoexcited carrier dynamics based on a multi-state, coupled rate equation model. We compare our theoretical results with recent tunable time resolved reflectivity measurements performed at the National High Magnetic Field Laboratory that study the relaxation dynamics when pumping and probing near the A and B excitons. In addition to solving the coupled rate equations, we also discuss the role of diffusion as well as phase space filling (non-linear rate equations) on the experimental results.

[1]Supported by NSF DMR-0325474 and the NHMFL In-house Reasearch Program.

Gary Sanders
University of Florida

Date submitted: 30 Nov 2005 Electronic form version 1.4