Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Ultrafast light-induced demagnetization in (III,Mn)V ferromagnetic semiconductors L. CYWINSKI, L. J. SHAM, University of California San Diego, Department of Physics, J. WANG, C. SUN, J. KONO, Dept. of Elec. and Comp. Engineering, Rice University, A. OIWA, University of Tokyo, H. MUNEKATA, Tokyo Institute of Technology — An ultrafast (subpicosecond) demagnetization process induced by intense laser irradiation has been recently observed in InMnAs [1]. We propose a theoretical model of magnetization dynamics on such a timescale which is based on the sp-d exchange interaction between the delocalized carriers' spins and localized Mn spins. Light excitation heats up a population of holes, taking it out of equilibrium with the Mn spins. This triggers the process of energy and angular momentum exchange between the two spin systems. Fast spin relaxation of holes sustains the flow of spin polarization leading to the possibility of significant demagnetization of the Mn system. Ultrafast magnetization dynamics in GaMnAs will also be discussed. This work was supported by DARPA, NSF, ONR and MEXT. [1] J. Wang et al., Phys. Rev. Lett. 95, 167401 (2005)

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Date submitted: 30 Nov 2005 Electronic form version 1.4