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Mid-infrared magneto-optical studies of $Ga_{1-x}Mn_xAs$ random alloy films G. ACBAS, S. WANG, M. CHEON, G.B. KIM, A. MARKELZ, H. LUO, B.D. MCCOMBE, J. CERNE[1], Physics Dept. Univ. at Buffalo, SUNY, Buffalo, NY, M. CUKR, V. NOVAK, Institute of Physics, Acad. of Sciences of the Czech Republic, Prague, Czech Republic, J. SINOVA, Physics Dept., Texas A&M Univ., College Station, TX, X. LIU, J.K. FURDYNA, Univ. of Notre Dame, Notre Dame, IN, T. WOJTOWICZ, Univ. of Notre Dame and Inst. of Physics, Polish Acad. of Sciences, Warsaw, Poland, M.A. SCARPULLA, O.D. DUBON, Univ. of California, Berkeley, CA — The mid-infrared (MIR: 115-238 meV) complex Faraday and Kerr effect are systematically studied in $Ga_{1-x}Mn_xAs$ random alloy films as a function of temperature, frequency, and Mn concentration. The strong MIR magneto-optical response shows clear ferromagnetic behavior that is consistent with dc magnetization measurements. The real and imaginary parts of the measured Faraday and Kerr angles are of the same order of magnitude as predicted by effective k·p Hamiltonian models within a mean field treatment [J. Sinova et al., PRB 2003]. Samples from from four different groups are studied, and although parameters such as the Mn-doping, annealing conditions, and resistivity vary from sample to sample, universal trends in the frequency dependence of the MIR magneto-optical response are observed. This work was supported by DARPA/ONR N0001400-1-0951.

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Gheorghe Acbas
Physics Dept. Univ. at Buffalo, SUNY, Buffalo, NY

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