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Magneto-Optical Kerr Spectroscopy of Moderately Doped GaMnAs: Evidence for Interband Transitions C. SUN, Rice University, J. KONO, Rice Univeristy, Y.H. CHO, A.A. BELYANIN, Texas A&M University, H. MUNEKATA, Tokyo Institute of Technology — The role of impurity bands as well as the nature of free holes in carrier-mediated ferromagnetism in (III,Mn)V systems are still not well understood. Previous magneto-optical studies of GaMnAs have produced an array of conflicting results, especially in terms of the nature of optical transitions involved. Here, we have performed systematic magneto-optical Kerr spectroscopy studies of GaMnAs samples with different doping densities. The Kerr angle strongly depended on the photon energy, showing positive peaks at 1.7 eV and 3 eV and a negative peak at 2.5 eV. The 1.7 eV peak clearly shifts to higher energies with Mn doping from 1% to 2.4% and shifts to an even higher energy after annealing. We attribute these changes to the increased hole density and effective Mn content. A 30-band $\boldsymbol{k \cdot p}$ model with exchange interaction is adopted to simulate the spectra. The excellent agreement between the experiment and calculation leads us to conclude that Kerr rotation in GaMnAs above the band gap is dominantly determined by interband transitions.

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