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Infrared to visible magneto-optical effects in (Ga,Mn)As N. TESAROVA, C.T. ELLIS, G. ACBAS, A. MUKHERJEE, K. VYBORNY, J. CERNE, Physics Dept., University at Buffalo, SUNY, J. SUBRT, T. OSTATNICKY, P. NEMEC, Faculty of Mathematics and Physics, Charles University in Prague, Czech Rep., V. NOVAK, Institute of Physics ASCR, v.v.i., Prague, Czech Rep., J. SINOVA, Dept. of Physics, Texas A&M Univ., College Station, TX
— (Ga,Mn)As is perceived as a model material for future low-power spintronics devices due to its carrier mediated ferromagnetic properties. Despite the extensive theoretical and experimental studies, the energy band structure and the mechanism of ferromagnetic order (of Mn spins) still remains a matter of controversy [Ohya, Nature Physics 2011; Jungwirth, PRL 2010]. In our study, we employ magneto-optical Faraday and Kerr measurements to probe the character of the states near the Fermi energy, which is expected to be responsible for Mn-ordering. We also study the spectral dependence of magnetic linear dichroism that is mainly sensitive to the states mediating the Mn-Mn interaction [Kimel, PRL 2005]. The measurements are performed from the infrared to visible range (100 – 2600 meV) on high quality samples with different Mn concentration (1.5 – 14 %) with Curie temperatures up to 190 K. The results are compared with the predictions of $k.p$ theory with antiferromagnetic $p-d$ exchange. We acknowledge the financial support provided by NSF-DMR1006078 and Faculty of Mathematics and Physics, Charles University in Prague.

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