Systematic study of magnetic linear dichroism and birefringence in (Ga,Mn)As

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Magnetic linear dichroism and birefringence in (Ga,Mn)As epitaxial layers are investigated by measuring the polarization plane rotation of reflected linearly polarized light when magnetization lies in the plane of the sample. We report on the spectral dependence of the rotation angle (together with ellipticity) in the very broad energy range of \(0.12 - 2.7\) eV for a sequence of optimized samples covering a wide range on Mn-dopings and Curie temperatures and find a clear blue shift of the dominant peak at energy exceeding the host material band gap. These results are discussed in the general context of the GaAs host band structure and also within the \(k \cdot p\) and mean-field kinetic-exchange model of the (Ga,Mn)As band structure. We discuss the role of disorder-induced non-direct transitions on magneto-optical properties of (Ga,Mn)As.

References: