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Optical and diamagnetic anisotropy of graphene oxide[1] A.L. EXARHOS, P.M. VORA, Z. LOU, A.T. JOHNSON, J.M. KIKKAWA, Department of Physics and Astronomy, University of Pennsylvania — We have recently shown that graphene oxide (GO) emits a broad photoluminescence (PL) band in both solid and aqueous preparations. The origin of this PL is not yet well understood, but for absorptive and emissive optical processes originating in the two dimensional GO plane, one expects an in-plane polarization. Studies of optical anisotropy can therefore help to clarify the origin of the PL. Here we use a method of optical nano-magnetometry (Torrens, et al, JACS 129, p. 252 (2007)) to extract these quantities, also determining the magnetic anisotropy. We find that when aqueous preparations of GO are placed in a magnetic field, diamagnetically induced alignment leads to marked linear polarization anisotropy of absorbance and photoluminescence. By taking six optical measurements at each magnetic field, we are able to extract the intrinsic polarization anisotropies of optical absorption and emission of GO flakes and to quantify the orbital diamagnetic anisotropy. We discuss how these quantities give insight into electronic delocalization in these systems.

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