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Electron-Hole Polarization Dynamics in Graphene Oxide¹ ANNEMARIE L. EXARHOS, MICHAEL E. TURK, ZHENG TANG LUO, A.T.C. JOHNSON, JAMES M. KIKKAWA, Department of Physics and Astronomy, University of Pennsylvania — Graphene oxide (GO) has been shown to emit broadband visible and near infrared photoluminescence (PL). Here we use polarization sensitive optical spectroscopy to study spectral diffusion and temporal dynamics of electron-hole polarization in this material. Steady state polarization memory measurements show strong polarization memory close to the excitation energy, which weakens gradually in moving toward lower emission energies. To understand the dynamics underlying this behavior, we also perform time-resolved PL studies using an optical Kerr gate with sub-picosecond temporal resolution. Polarization memories show ultrafast dynamics within the PL lifetime in solid GO preparations where the incident light lies fully in the plane of the GO flakes. Using additional knowledge gained from optical anisotropy measurements, we discuss the relevance of our polarization memory data to the origins of PL in these systems.

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