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Radicals in Graphene Oxide: Formation and Relaxation Properties DONALD HIRSH, LYLE NOLASCO, The College of New Jersey, MICHELE VITTADELLO, KAMIL WORONOWICZ, Medgar Evers College of CUNY, MANISH CHHOWALLA, Rutgers - The State University of New Jersey — Unpaired electron spins are observed in both graphene and graphene oxide but their origins remain uncertain. We apply electron paramagnetic resonance (EPR) spectroscopy to the study of graphene oxide produced by modified Hummer's method. A narrow radical signal easily saturated at cryogenic temperatures is observed. Treatment of graphene oxide with mild reductant results in the production of additional radicals of the same linewidth and g-value. We propose that radicals are generated when epoxide rings adjacent to graphene islands open through one-electron reduction and provide preliminary data in support of this claim. The EPR spectra and relaxation properties of graphene oxide in the solid-state and dispersed in water are also compared. This comparison suggests the presence of exchange coupling between radicals on adjacent graphene oxide particles in the solid state.

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