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Optical Properties of Graphene Oxide under Oxidative and Thermal Treatment MD. TANVIR HASAN, BRYAN SENGER, PRICE MULFORD, ANTON NAUMOV, Department of Physics and Astronomy, Texas Christian University — Graphene possesses a number of advantageous properties, however does not exhibit optical emission, which limits its use in optoelectronics applications. Unlike graphene, its functional derivative: graphene oxide (GO) exhibits active optical response. Influence of oxidative and thermal treatment on GO optical properties was observed. Oxidative ozone treatment of reduced graphene oxide (RGO) produced the change in color and absorption spectra of samples, indicative of transforming RGO into GO. Upon ozone treatment a broad fluorescence spectrum was observed in the visible previously not detected for RGO. Fluorescence signal measured continuously for the sample ozone-treated inside the spectrometer showed gradual increase with processing time. Temperature treatment of GO up to 95°C has shown reversal of optical signatures induced by ozonation, including fluorescence quenching and darkening of the sample. These optical changes help elucidate electronic origins of emission in graphene oxide. Theoretical modeling of GO based on our experimental data showed localization of the electronic density in the graphitic regions surrounded by functional groups, that may act as origins for emission.

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