

# Far-ultraviolet Absorption and Photoluminescence of Monolayer Graphene and Its Implications for Extended Red Emission

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## Abstract

A monolayer graphene (GR) film on a lithium fluoride substrate was prepared to measure the optical properties of graphene in the far-UV region. The photoabsorption of the GR/LiF sample was universal in the spectral region of 105–350 nm, with an excitonic band near 130 nm and the absorbance of the GR/LiF sample at 10 K was ~10% larger than that at 300 K. Upon far-UV excitation, the photoluminescence (PL) spectra of the GR/LiF sample showed a broad band at 630 nm at 300 K and two adjacent bands at 560 and 634 nm at 10 K. GR had a PL similar to the extended red emission (ERE) band, fulfilling the known observational model constraints of light-driven process dominated by far-UV excitations, carbonaceous nature of ERE carriers, and broad emission in red and near-IR region. The result implies that graphene materials are promising candidates for carriers for the ERE.

**Keywords – graphene, photoabsorption, photoluminescence**