How strain affect graphene’s optical contrast on SiO2/Si gratings

XUANYE WANG, KHWANCHAI TANTIWNICHAPAN, ROBERTO PAIELLA, ANNA SWAN, Department of Electrical Engineering, Boston University — Optical contrast interference provides a fast and easy method for identifying graphene layer number the widely used silicon dioxide/silicon substrates. Uniaxial strain deforms the band structure and consequently it has been suggested that optical absorption in visible range varies with strain. Here we explore how uniaxial strain affects the optical contrast. Mechanically cleaved single layer graphene is deposited onto sinusoidal shaped SiO2 optical diffraction grating. Graphene strains as it conforms to the corrugated surface. We observe a dramatic optical contrast change for the graphene on the grating under white light and different color channels. To quantitatively analyze this optical response, we map graphene’s strain distribution by analyzing redshift of G and 2D peaks positions in Raman line scan measurement and compare with AFM measurements to compare optical and Raman results with how well graphene conforms to the corrugated surface. We explore different surface treatments that vary the friction between the graphene and the corrugated oxide in order to control the strain and the conformation.


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