

Optical properties of graphene flakes in aqueous solutions

Presenting Author : Milena Ojrzyńska

Co-Authors : Anna Wróblewska, K. Żerańska-Chudek, Michał Świniarski, Karolina Czerniak, Jarosław Judek, Mariusz Zdrojek

Faculty of Physics, Warsaw University of Technology, Koszykowa 75, 00-662 Warsaw, Poland

milaojrzyńska@gmail.com

Abstract

This work describes a theoretical background and studies on the optical properties of graphene flakes in aqueous solutions. The solutions of graphene and graphene oxide in specific solvents were prepared for further measurements. The graphene flakes have undergone liquid exfoliation followed by optical tests allowing the analysis of their properties. The exfoliation process consisted of selecting the appropriate solvent, ultrasonic treatment solution and centrifuge. Investigations of optical properties - absorption, absorbance, transmission and reflection were carried out by the Bentham PVE300 photovoltaic spectral response analyzer in the range from near UV to IR. In addition, vacuum filtration was applied to determine the concentration of solutions and calculate the absorption coefficient based on the Lambert-Beer law. The graphene flakes were also examined with a scanning optical microscope to determine the purity of the samples and the size of the flakes. The results present the analysis of the optical properties of the graphene flakes depending on their concentration and comparison of absorption coefficients of graphene, graphene oxide and reduced graphene oxide.

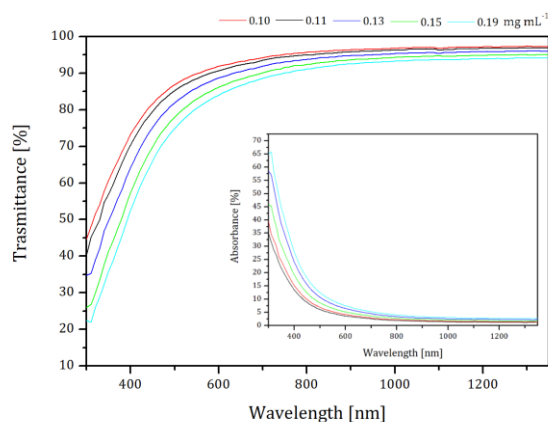


Figure 1: Transmittance and absorbance for graphene oxide measured by UV-VIS spectroscopy

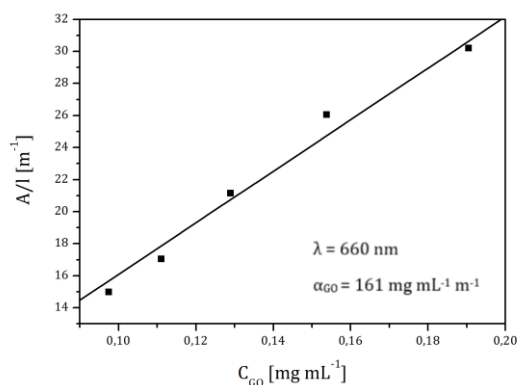


Figure 2: Absorption coefficient for graphene oxide at 660nm wavelength calculated from Lambert-Beer's law.

Figures