FABRICATION AND CHARACTERISATION OF GRAPHENE OXIDE FILMS WITH CONTROLLED THICKNESS ON SILICON BASED SUBSTRATES

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ABSTRACT TEXT

Carbon-based films have attracted considerable attention due to their potential applications, ranging from durable nanoelectronics to efficient gas sensors and solar cells. In this regard, the outstanding mechanical and electrical properties of graphene, combined with its excellent optical transparency, offer a huge potential in the fabrication of thin, strong and efficient coatings. However, the progress in the high-yield production of graphene with specific properties is the critical step in bringing graphene applications to market. Owing to the production scalability and the convenience in processing, graphene oxide (GO) has now become an important precursor for the fabrication of graphene-based thin films. In fact, for several applications, the properties of GO are good enough and therefore its reduction is not required.

Among the broad range of available deposition techniques, dip coating is an effective method of fabricating good quality thin films. Low cost, simplicity in operation and coating uniformity are key advantages of this method. Additionally, dip coating enables the fabrication and up scaling to mass production of complex, large surface area films.

In this work, the dip coating technique was used to fabricate graphene oxide films. The deposition process and, consequently the film thickness, was controlled by adjusting the immersion time and the number of immersion dips. This study and experimentation also demonstrate the significance of the interlayer used to aid the adhesion of GO to specific substrates. The morphological characteristics of the obtained films were also determined by means of AFM, SEM and water contact angle measurements.