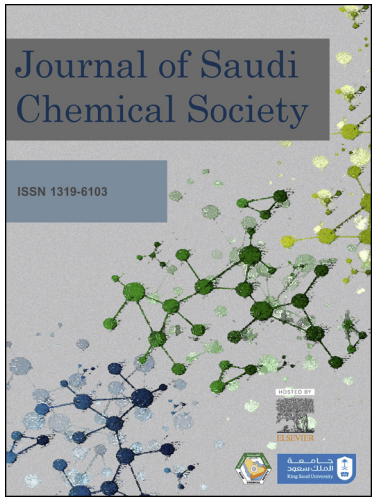

Original article

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Low- Temperature Synthesis and Characteristics of Fractal Graphene Layers

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Abstract Large scale fractal graphene layers are obtained by complex method of liquid phase exfoliation and self- organization. Atomic force microscopy (AFM) is used to study the surface properties of formed layers and to assess their thickness. Surface potential of graphene and potential transition between the graphene and substrate is measured by Kelvin probe method. The influence of the effect of dielectric confinement on the optical properties of graphene is discussed in this work. Raman scattering spectra were used for structural analysis and assessment of the level of defects. Current-voltage characteristics of graphene ribbons were measured and discussed for different number of layers.

Keywords: Graphene, AFM, Absorption, Raman spectroscopy, Current-Voltage characteristic.

1. Introduction

Carbon nanostructures and especially graphene are under general attention of international science society due to their unique physical properties and huge application potential [1-5]. Production of such nanostructures by the most optimal methods is the goal of many studies [6-9]. At present, intensive research is being carried out to develop simple low-temperature methods for the synthesis of graphene and related materials [10, 14]. The methods based on exfoliation deserve special attention, among other methods. [12-14]. The formation of graphene using this method basically does not require the creation of chemical strong σ-bonds in the graphene plane. That's why there is no need for high energy while obtaining graphene. There is only needed to break the fragile π chemical bonds between the graphene sheets, which are forming highly oriented pyrolytic graphite (HOPG). Consequently, the use of such methods for the production of graphene is optimal and easy to implement. The only problem in this context is the small surface area of single-layer graphene and the high level of defects. On the other hand the majority of graphene production processes, including the method, based on joining of already exfoliated graphene flakes, is accompanied