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Ali Hosseinpour, Hossein Abdizadeh, Mohammad Reza Golobostanfard

PII: S0040-6090(17)30268-7
DOI: doi: 10.1016/j.tsf.2017.04.013
Reference: TSF 35921

To appear in: *Thin Solid Films*

Received date: 6 September 2016
Revised date: 6 March 2017
Accepted date: 7 April 2017

Please cite this article as: Ali Hosseinpour, Hossein Abdizadeh, Mohammad Reza Golobostanfard , Comparing the electrophoretic deposition process of graphene oxides synthesized through different methods. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Tsf(2017), doi: 10.1016/j.tsf.2017.04.013

Comparing the Electrophoretic Deposition Process of Graphene Oxides Synthesized Through Different Methods

Ali Hosseinpour[1], Hossein Abdizadeh[1,2], Mohammad Reza Golobostanfard[1,*]

[1]School of Metallurgy and Materials Engineering, College of Engineering, University of Tehran, P.O. Box: 14395-553, Tehran, Iran

[2]Center of Excellence for High Performance Materials, University of Tehran, Tehran, Iran

Abstract

Graphene oxide (GO) is synthesized through two different chemical methods, namely modified improved method (MIM) and modified Hummers method (MHM). Electrophoretic deposition of GO obtained from those methods is performed on the Fluorine doped tin oxide glass. substrates by dispersing GO sheets in acetonitrile and applying voltage. UV-Vis and Raman spectroscopies show that pristine graphite is less oxidized in the MIM. However, X-Ray diffraction patterns indicate that d-spacing of GO sheets is more increased in the MIM (d-spacing of 0.94 nm vs. 0.77 nm). Also, Fourier-transformed infrared spectroscopy reveals that GO synthesized through the MIM contains more C=O functional groups on its surface. As a result, current density-time diagrams and field emission scanning electron microscope (FESEM) cross-sectional images of electrophoretically deposited GO films are indicative of higher average deposition rate in the MIM compared to MHM (~5.1 nm/s vs. ~1.8 nm/s). FESEM images of the two films show that surface roughness of the MIM film is lower than that of MHM film as well.

* Corresponding author: Tel.: +98-9122300382; Fax: +98-21-88006076. E-mail address: Bostanfr@ut.ac.ir