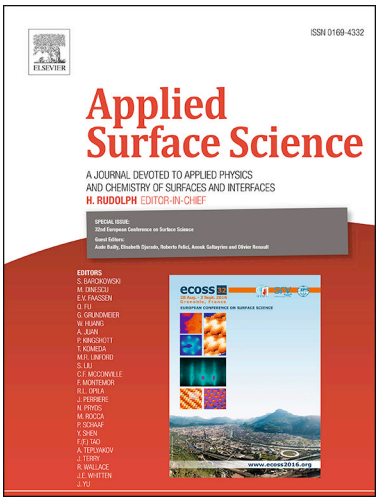
Accepted Manuscript



Full Length Article

Hydrophobic and optical characteristics of graphene and graphene oxide films transferred onto functionalized silica particles deposited glass surface

B.S. Yilbas, A. Ibrahim, H. Ali, M. Khaled, T. Laoui

PII: S0169-4332(18)30531-2
DOI: https://doi.org/10.1016/j.apsusc.2018.02.176
Reference: APSUSC 38634

To appear in: *Applied Surface Science*

Received Date: 14 November 2017
Revised Date: 22 January 2018
Accepted Date: 17 February 2018

Please cite this article as: B.S. Yilbas, A. Ibrahim, H. Ali, M. Khaled, T. Laoui, Hydrophobic and optical characteristics of graphene and graphene oxide films transferred onto functionalized silica particles deposited glass surface, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.02.176

HYDROPHOBIC AND OPTICAL CHARACTERISTICS OF GRAPHENE AND GRAPHENE OXIDE FILMS TRANSFERRED ONTO FUNCTIONALIZED SILICA PARTICLES DEPOSITED GLASS SURFACE

B. S. Yilbas[1,2*] A. Ibrahim[3] H. Ali[2] M. Khaled[4] T. Laoui[2]

[1] Center of Excellence in Renewable Energy, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia, *Corresponding author & Email: bsyilbas@kfupm.edu.sa
[2] ME Department, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia
[3] Department of Mechanical Design and Production Engineering, Zagazig University, Zagazig Egypt,
[4] CHEM Department, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia,

ABSTRACT

Hydrophobic and optical transmittance characteristics of the functionalized silica particles on the glass surface prior and after transfer of graphene and graphene oxide films on the surface are examined. Nano-size silica particles are synthesized and functionalized via chemical grafting and deposited onto a glass surface. Graphene film, grown on copper substrate, was transferred onto the functionalized silica particles surface through direct fishing method. Graphene oxide layer was deposited onto the functionalized silica particles surface via spin coating technique. Morphological, hydrophobic, and optical characteristics of the functionalized silica particles deposited surface prior and after graphene and graphene oxide films transfer are examined using the analytical tools. It is found that the functionalized silica particles are agglomerated at the surface forming packed structures with few micro/nano size pores. This arrangement gives rise to water droplet contact angle and contact angle hysteresis in the order of 163^o and 2^o, respectively, and remains almost uniform over the entire surface. Transferring graphene and depositing graphene oxide films over the functionalized silica particles surface lowers the water droplet contact angle slightly (157^o – 160^o) and increases the contact angle hysteresis (4^o). The addition of the graphene and graphene oxide films onto the surface of the deposited functionalized silica particles improves the optical transmittance.

Keywords: Hydrophobicity, silica particles, graphene film, graphene oxide film, optical transmittance