Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 39 2024

Colloquium on Applied Sciences 2024
19-21 January 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Graphene Transfer: Influence of Polymethylmethacrylate (PMMA) Layers on Graphene Properties

Siti Nur Surayah[a], Zuraida Khusaimi[a*]

Structured Abstract

Background: Graphene is the most fascinating nanomaterial to be studied due to its outstanding properties such as optical properties and has been used in a lot of fields. The most crucial and critical part in the graphene synthesis process was the transfer process from metal substrate to target substrate which is ITO.

Methods: In this work, the graphene single layer has been synthesized using thermal chemical vapor deposition (TCVD) and waste engine oil (WEO) as the precursor and on a nickel (Ni) substrate. After the growth of graphene on the Ni was completed the graphene were transferred using Polymethylmethacrylate (PMMA). The effect of PMMA layers used in the transfer process on graphene final properties were investigated. The number of layers of PMMA used to transfer the graphene to the target substrate which is ITO were varied at 1, 2, 3, 4 and 5 layers, while keeping other parameters, like synthesis time, constant. The characterization process to determine the effect of the PMMA layers used on the synthesized graphene was done using Field emission scanning electron microscopy (FESEM), UV-Visible spectroscopy and X-ray diffraction (XRD).

Results: When one layer of PMMA was used to transfer the graphene, the FESEM result shows the graphene distribution on the ITO and can be seen clearly but as the number of PMMA layers used increases the graphene becomes fully covered by the PMMA residue and cannot be seen by FESEM. The UV-Vis result shows the higher absorbance value with a sharp peak at 318 nm which indicates the presence of the graphene. From the result, it can be seen that as the number of PMMA layers used elevated, the absorbance value decreased. Last but not least, XRD results show peaks at 38.65° have higher intensity when one layer of PMMA is used which indicates the optimum presence of a graphene layer on the ITO.

Conclusion In conclusion, Transfer process using Polymethylmethacrylate (PMMA) stands out as the most popular method to transfer graphene but once the PMMA attached to the graphene it was hard to remove and the residue that left on the graphene cause destructive effect on the graphene.

Keywords: Graphene, PMMA, ITO, transfer process.

*Correspondence: zurai142@salam.uitm.edu.my

[a]School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia.