

Changing in Sensing Mechanism of Graphene Oxide Gel Photodetector

Dawood Alsaedi^{1,2,3}, Khaled M. Ibrahim¹, Mehrdad Irannejad¹, K.P. Mussleman¹, Mustafa Yavuz¹, Omar Ramahi²

¹Waterloo Institute for Nanotechnology, University of Waterloo, 200 University Avenue West , Waterloo, Canada

²Electrical and Computer Engineering, University of Waterloo, Waterloo, ON, Canada

³Electrical Engineering Collage, Taif University, Taif, Saudi Arabia

Email: dalsaedi@uwaterloo.ca

Abstract:

Even though graphene-based devices show a wide range of wavelength detection¹, operating the photodetector under ambient environment affects its stability and sensitivity². Here in, we report the consequences of coating graphene oxide gel based photodetector with a thin layer of the poly(methyl methacrylate), PMMA, to enhance the sensitivity and stability of the photodetector. In this work, the graphene oxide gel/PMMA hybrid materials which is transparent to the incident light, and has no detrimental effects on the electrical properties of the sensor were used in the interdigitate structure as active material and it is shown in Fig,A . Using this hybrid material is a promising candidate to address the photodetector instability that results from the interaction between the sensing area in the device and the ambient molecules³. By using the white light as incident light, a significant stability in operation was absorbed compare to uncoated device during characterization in air. Unlike uncoated device, a remarkable current stability can be achieved in the PMMA coated device even with repeating the measurement for several times. A significant changes were recorded in the sensitivity of the photodetector after coating the sensing area with a thin layer of PMMA as shown in Fig.B and C. While the sensitivity varies between no sensing under low power illumination and bolometric effect under high power illumination in exposed area, the PMMA-coated device shows photovoltaic effect and more sensitivity under low power illumination. This could open a new aspect on studying of the stability and sensing mechanism of graphene-base devices that operated in ambient environment.

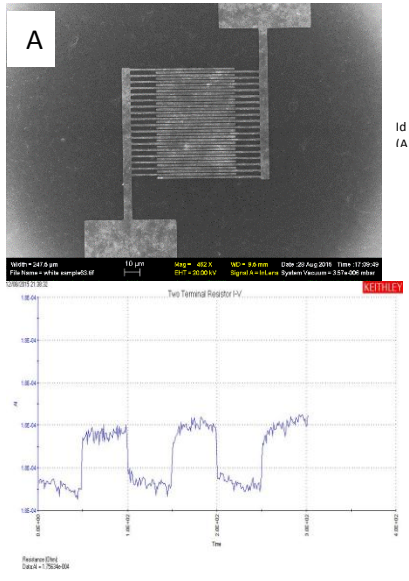
References

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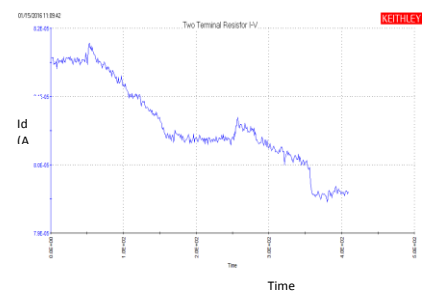
Figures:

B

C



Time



A) Interdigitate photodetector. B) The photoresponse of the device without coating layer. C) with coating layer.