GRAPHENE/TiO_2 NANOSTRUCTURES INTEGRATED WITH MICRO-LIGHT - PLATES FOR NO_2 DETECTION

Paniz Vafaei[1], Margus Kodu[1], Olga Casals,[2] Daniel Prades,[2] Raivo Jaaniso[1]

[1]*Institute of Physics, University of Tartu, W.Ostwaldi 1, 50411 Tartu, Estonia*
[2]*Institute of Electronics, Universitat de Barcelona, E-08028 Barcelona, Spain*
e-mail: paniz.vafaei@ut.ee

In this work, we have developed a nitrogen dioxide gas sensor that integrates CVD graphene, functionalized with laser-deposited metal oxide nanostructures, and micro-light-plates (µLP) with a 380 nm wavelength emission and sensing area of 190×250µm^2. To make the sensor, we transferred single-layer CVD graphene onto µLP chips and coated it with a layer of ~0.5 nm TiO_2. We systematically studied the dependence of graphene conductance and gas sensitivity under different LED light intensities. Functionalized graphene had significantly larger responses (over 10% at 40 ppb of NO_2), and it showed a low limit of detection (≤5 ppb). Moreover, the response and recovery time decreased with increasing the power of micro-LED. The investigated materials and devices are interesting for creating ultra-low-power IoT (Internet of Things) sensors.

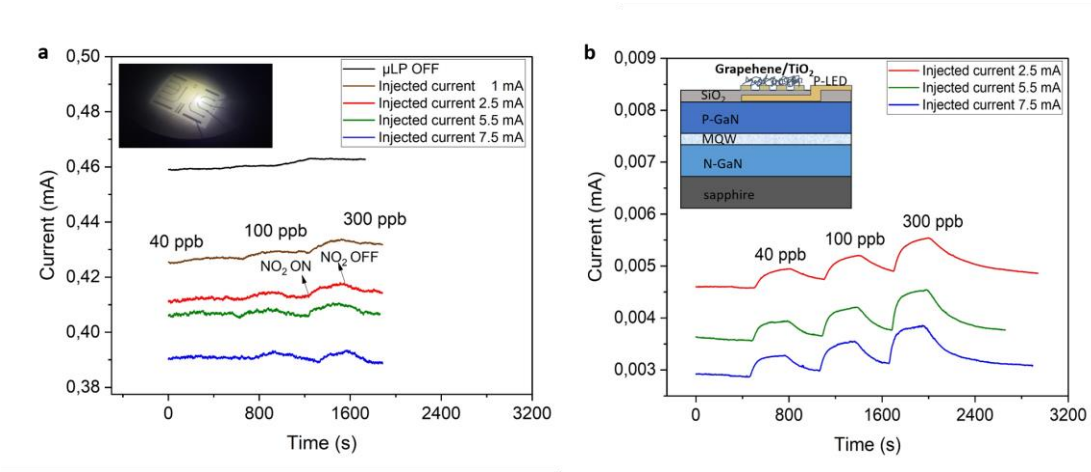

Fig1. *Photoactivated responses of a) pristine graphene (inset: an image of the device), and b) TiO_2 functionalized graphene (inset: cross-section of the device structure [1]), to 40-300ppb NO_2 under various driving currents of micro-LEDs.*

References

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2. M.; Kodu,. et al. 2019, *Sensors*, 19, 951.

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