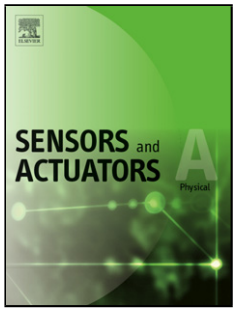

Title: Fully integrated wearable humidity sensor based on hydrothermally synthesized partially reduced graphene oxide

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PII: S0924-4247(18)30498-9
DOI: https://doi.org/10.1016/j.sna.2018.06.052
Reference: SNA 10857

To appear in: *Sensors and Actuators A*

Received date: 21-3-2018
Revised date: 9-6-2018
Accepted date: 27-6-2018

Please cite this article as: Shojaee M, Nasresfahani S, Dordane MK, Sheikhi MH, Fully integrated wearable humidity sensor based on hydrothermally synthesized partially reduced graphene oxide, *Sensors and Actuators: A. Physical* (2018), https://doi.org/10.1016/j.sna.2018.06.052

Fully integrated wearable humidity sensor based on hydrothermally synthesized partially reduced graphene oxide

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Highlight

- Partially reduced graphene oxide nanosheets were prepared by a facile hydrothermal route.
- Oxygen functional groups of GO were removed by increasing the hydrothermal reduction time.
- The humidity sensors were fabricated on a flexible polyimide substrate.
- The humidity sensing properties of materials were measured.
- The PRGO-4h sensor presented an admirable response, fast response/recovery speed and acceptable stability.

Abstract

In this paper, partially reduced graphene oxide (PRGO) nanosheets were prepared by an environmentally friendly hydrothermal route and their morphology, structure and humidity sensing performance were investigated. The sensor structure with gold interdigitated electrodes was fabricated on flexible polyimide substrate via standard lithography technology. The integration of a commercial Bluetooth module enabled real-time wireless transmission of sensing data to the smart phone application. Characterization data showed a decrease in the amount of oxygen functional groups attached to the PRGO nanosheets when the hydrothermal reduction time was increased. It was found that the flexible PRGO-4h sensor exhibits impressive response and quick response/recovery times over a wide range of RH levels. According to the experimental results, the enhanced response of PRGO-4h is attributed to the considerable oxygen functional groups and the improved response/recovery times are attributed to the restoration of sp^2 carbon network. The performance of sensor remained nearly unchanged under bending condition. Taking the advantage