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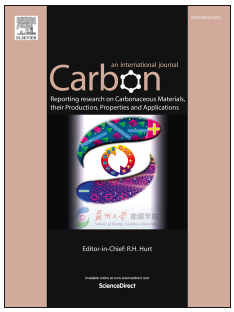

All-printed humidity sensor based on graphene/methyl-red composite with high sensitivity

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All-printed humidity sensor based on graphene/methyl-red composite with high sensitivity

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Abstract:

To monitor the most common constituted H_2O in the air for health and environment applications, we proposed a highly sensitive humidity sensor consisted of silver inter-digital electrodes and graphene (G)/methyl-red (M-R) composite layer. Here, the dimensions the proposed silver inter-digital electrodes are 200 µm finger width, 400 µm spacing, and 400 nm thickness, which is fabricated on a low cost transparent polyethyleneterephthalate (PET) substrate through commercialized Dimatix material inkjet printer (DMP-3000). To achieve a high sensitivity and wide sensing range, the methyl-red composite thin film layer is deposited over the silver inter-digital electrodes through electrohydrodynamic (EHD), and its thickness is ~300 nm. The sensor electrical resistance inversely varies from 11 MΩ to 0.4 MΩ against the relative humidity (RH) content from 5% to 95%. The proposed humidity sensor showed 96.36% resistive and 2869500% capacitive sensitivity against humidity. The response and recovery time of the proposed sensor is 0.251s and 0.35s, respectively.

Key words: Humidity sensor, Graphene/methyl red, Silver nanoparticle, DMP-3000,high sensitivity, wearable electronics, direct readout.

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