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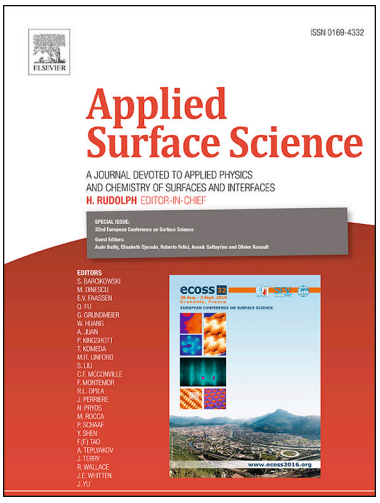

Full Length Article

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PII: S0169-4332(18)30695-0
DOI: https://doi.org/10.1016/j.apsusc.2018.03.035
Reference: APSUSC 38783

To appear in: *Applied Surface Science*

Received Date: 14 September 2017
Revised Date: 15 January 2018
Accepted Date: 5 March 2018

Please cite this article as: W. Kyum Kim, C. Wu, T. Whan Kim, Effect of a PEDOT:PSS modified layer on the electrical characteristics of flexible memristive devices based on graphene oxide:polyvinylpyrrolidone nanocomposites, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.03.035

Effect of a PEDOT:PSS modified layer on the electrical characteristics of flexible memristive devices based on graphene oxide:polyvinylpyrrolidone nanocomposites

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Abstract

The electrical characteristics of flexible memristive devices utilizing a graphene oxide (GO):polyvinylpyrrolidone (PVP) nanocomposite charge-trapping layer with a poly(3, 4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS)-modified layer fabricated on an indium-tin-oxide (ITO)-coated polyethylene glycol naphthalate (PEN) substrate were investigated. Current-voltage (I-V) curves for the Al/GO:PVP/PEDOT:PSS/ITO/PEN devices showed remarkable hysteresis behaviors before and after bending. The maximum memory margins of the devices before and after 100 bending cycles were approximately 7.69×10^3 and 5.16×10^2, respectively. The devices showed nonvolatile memory effect with a retention time of more than 1 x 10^4s. The "Reset" voltages were distributed between 2.3 and 3.5 V, and the "Set" voltages were dispersed between -0.7 and -0.2 V, indicative of excellent, uniform electrical performance. The endurance number of ON/OFF-switching and bending cycles for the devices was 1×10^2, respectively. The bipolar resistive switching behavior was explained on the basis of I-V results. In particular, the bipolar resistive switching behaviors of the LRS and the HRS for the devices are dominated by the Ohmic and space charge current mechanisms, respectively.

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