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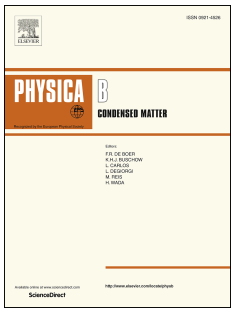

Printing an ITO free flexible poly (4-vinylphenol) resistive switching device

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Printing an ITO Free Flexible Poly (4-Vinylphenol) Resistive Switching Device

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Abstract

Resistive switching in a sandwich structure of silver (Ag)/Polyvinyl phenol (PVP)/carbon nanotube (CNTs)-silver nanowires (AgNWs) coated on a flexible PET substrate is reported in this work. Densely populated networks of one dimensional nano materials (1DNM), CNTs-AgNWs have been used as the conductive bottom electrode with the prominent features of high flexibility and low sheet resistance of 90 Ω/sq. Thin, yet uniform active layer of PVP was deposited on top of the spin coated 1DNM thin film through state of the art printing technique of electrohydrodynamic atomization (EHDA) with an average thickness of 170 ± 28 nm. Ag dots with an active area of ~ 0.1 mm^2 were deposited through roll to plate printing system as the top electrodes to complete the device fabrication of flexible memory device. Our memory device exhibited suitable electrical characteristics with OFF/ON ratio of 100:1, retention time of 60 minutes and electrical endurance for 100 voltage sweeps without any noticeable decay in performance. The resistive switching characteristics at a low current compliance of 3 nA were also evaluated for the application of low power consumption. This memory device is flexible and can sustain more than 100 bending cycles at a bending diameter of 2 cm with stable HRS and LRS values. Our proposed device shows promise to be used as a future potential nonvolatile memory device in flexible electronics.

Keywords: PVP; CNTs-AgNWs; Memristor; Flexible; ITO-free; EHDA