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Single-Walled Carbon Nanohorns Functionalization of PVA/PDMS for Flexible Triboelectric Nanogenerators: IoT Remote Gait Sensor

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Abstract-

Composite nanomaterials comprise emerging materials for triboelectric nanogenerators (TENGs), as they provide higher voltage output than pristine polymer-based systems. Currently, efforts are aimed at improving the charge transfer between the tribolayers, which could be obtained by nanomaterial doping. Herein, the effect of synthesized single-walled carbon nanohorns (SWCNHs), an alternative to conventional carbon nanotubes (CNTs), on two different materials, polyvinyl alcohol (PVA) and polydimethylsiloxane (PDMS) is studied. In both cases, the addition of SWCNHs increases the dielectric constant of the layers. The TENG with the modified PDMS (mPDMS) showed the maximum voltage output, almost duplicating the one obtained with the pristine sample. Furthermore, a possible Internet of Things (IoT) application has been demonstrated, with the use of wireless technology and Lo-Ra communications as a gait sensor to provide evolution and information regarding the health condition and the footprint of a patient.

Index Terms- IoT; single-walled carbon nanohorns; SWCNHs; TENGS

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