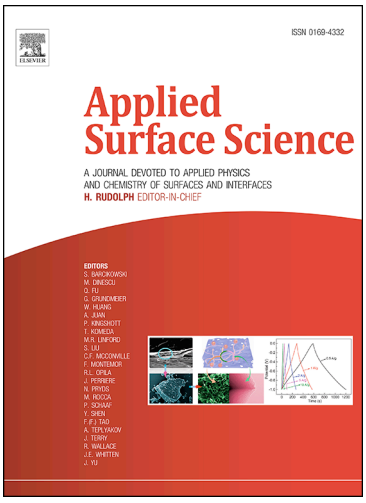

Full Length Article

Highly flexible triboelectric nanogenerators fabricated utilizing active layers with a ZnO nanostructure on polyethylene naphthalate substrates

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Highly flexible triboelectric nanogenerators fabricated utilizing active layers with a ZnO nanostructure on polyethylene naphthalate substrates

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ABSTRACT

Atomic force microscopy images showed that layers with a ZnO nanostructure were regularly formed on polyethylene naphthalate (PEN) substrates coated with indium tin oxide. The output voltage of triboelectric nanogenerators (TENGs) containing layers with the ZnO nanostructure and operating in the vertical contact-separation mode was approximately 20 V, which indicated that the power was enhanced by a factor of 2 compared to that of the TENG without such layers. Bending endurance tests on the TENGs demonstrated high stability under the stress caused by bending at an angle of 90º. The average open-circuit voltage of the TENGs operating in the ambient atmosphere was reduced by only 22% after 2000 bendings. This endurance of the TENGs under bending in air could be attributed to the presence of the layers with the ZnO nanostructure.

Keywords: Triboelectric nanogenerator, ZnO nanostructure, bending endurance, open-circuit voltage, flexible device

Recently, with the rapid advances in flexible/wearable electronic devices, the demand for

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