Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Improved performance of p-n junction-based ZnO Nanogenerators through CuSCN-passivation of ZnO nanorods

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Measurement Repeatability

The measurement repeatability of the peak open-circuit voltage output over a number of cycles is shown in Figure S1. The device demonstrated stable output when the bend release test was repeated for 10 cycles.

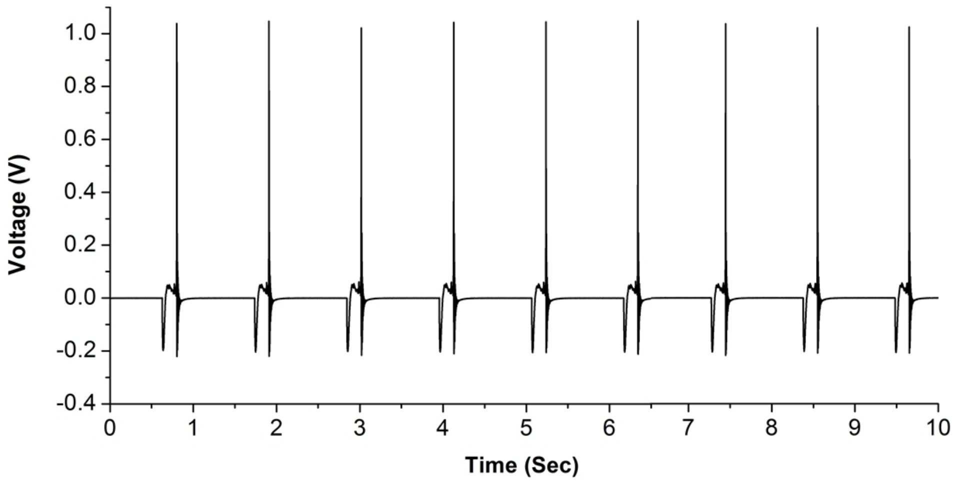

Figure S1. Nanogenerator peak open-circuit voltage output recorded for 10 cycles of mechanical excitation.

Bend and Release Measurement Analysis

Bend and release measurement was performed simultaneous with the peak open-circuit voltage recording of the device (Figure S2). This measurement was performed using MEL M5 laser triangulation sensor. The displacement profile shows that the cam rotating at 1 Hz bent the device upward to ≈6 mm and released at 1540 mm/sec (obtained from time-dependent displacement calculation). At the time of release when the maximum displacement rate was attained, the device generated a peak voltage output (Figure S2). Before the bottom flexible substrate of the device came to rest, it experienced mechanical oscillations which caused the device to generate oscillatory voltage peaks at the substrate resonance frequency. Therefore, the main peak voltage output signal was followed by the electrical responses from the mechanical oscillatory motion of the substrate and they varied between devices.

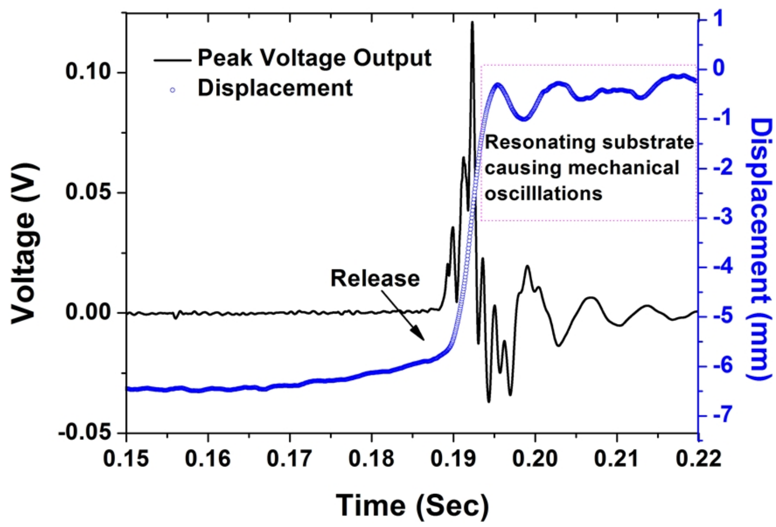

Figure S2. Nanogenerator bend release displacement measured simultaneous to its peak voltage output.

Device Output Stability Test

The long-term performance stability was studied for a non-coated ZnO/PEDOT:PSS device. The resistive load matching curves are presented in Figure S3 which demonstrate the variation in nanogenerator peak power density across optimum resistive load over a period of 40 days. An initial measurement was carried out after fabrication and the calculated peak power density of 35 μWcm^{-2} was obtained. The device was stored and measured in the similar way after an interval of 30 days and the observed performance did not vary significantly. However, after another 10 days (total 40 days), the performance of the device degraded and its peak power density reduced from 35 μWcm^{-2} to 20 μWcm^{-2}. This was linked to the environmental degradation effects on the PEDOT:PSS top layer and ZnO nanorods. This problem can be resolved by encapsulating the device using flexible polymer layer.

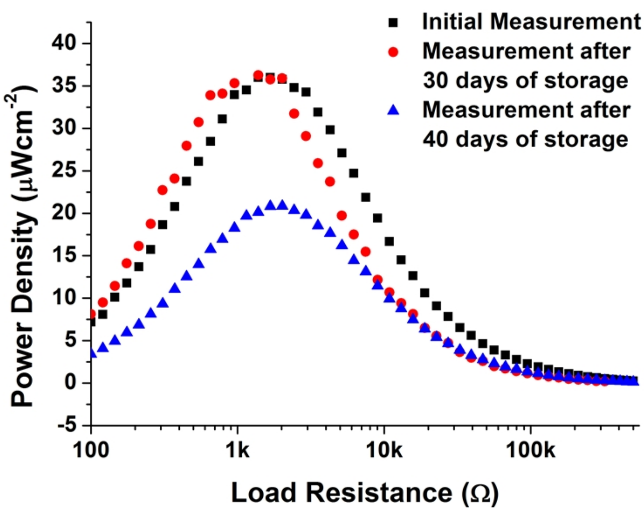

Figure S3. Long-term performance stability test on non-coated ZnO/PEDOT:PSS nanogenerator.