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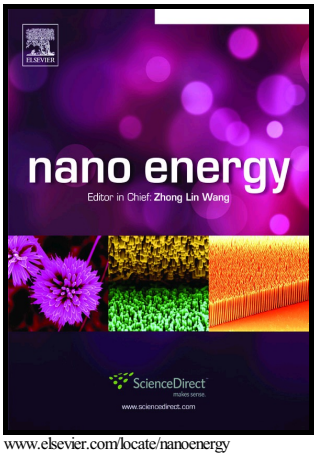

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PIEZO-TRIBO NANOENERGY HARVESTER USING HYBRID POLYDIMETHYL SILOXANE BASED NANOCOMPOSITE

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Abstract: The authors propose a hybrid nanocomposite based piezo-tribo nanoenergy harvester using polydimethylsiloxane (PDMS) which is of low cost, fabricated in simple steps, without external poling of the film and is mass producible. A nanocomposite of ZnO nanorods, exfoliated graphene oxide and multiwalled carbon nanotubes are dispersed in PDMS resin. Dynamic contact mode electrostatic force microscopy is performed to analyse the ferroelectric and piezoelectric property of the prepared hybrid nanocomposite. Using the above nanocomposite, a device is fabricated which works on combined effect of piezoelectric and triboelectric characteristic of materials under study. Qualitative studies are performed on this using force sensitive resistor. The device generated a maximum voltage of 7.5 V in the case of higher pressure (analog reading>800). Quantitative studies are conducted using a universal vibration apparatus at various revolutions per minute and maximum of 15.25 V is obtained. Hybrid nanocomposite device is scaled up in dimension and is tested under irregular finger assisted tapping, press-release operation and human footsteps yielding an output voltage of 36 V, 40 V and 50 V respectively. The obtained alternating voltages are rectified and stored into a commercial capacitor . Enhancing the current characteristics of the piezo-tribo device will prove to be an excellent substitute for energy harvesting and self-powering applications.