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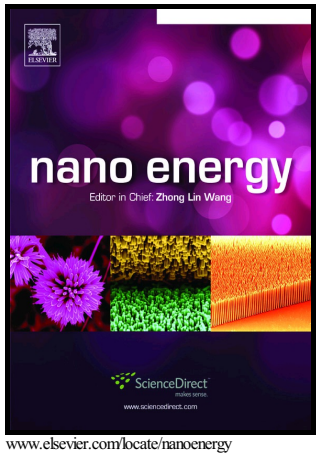

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Self-powered transparent glass-based single electrode triboelectric motion tracking sensor array

Jinkai Chen[1], Peng Ding[1], Ruizheng Pan[1], Weipeng Xuan[1], Dapeng Guo[2], Zhi Ye[1], Wuliang Yin[3], Hao Jin[1], Xiaozhi Wang[1], Shurong Dong[1*], Jikui Luo[4,5*]

[1]*Coll. of Info. Sci. & Electron. Eng., Zhejiang University, 38 Zheda Road, Hangzhou 310027, China.*
[2]*Dept. of Appl. Phys., Chang'an University, Xi'an 710064, China.*
[3]*Sch. of Elec. and Electron. Eng., The University of Manchester, Manchester M60 1QD, U.K.*
[4]*Coll. of Electron. & Info. Hangzhou Dianzi University*
[5]*Inst. of Renew. Energy & Environ. Technol., Bolton University, Deane Road, Bolton BL3 5AB, UK*

Abstract:

A glass-based single electrode triboelectric generator (SETEG) is developed with polydimethylsiloxane (PDMS) as the negative material. Its performance under different contact forces, frequencies and spacers is investigated in detail. The SETEGs have higher electric output under higher contact force, frequency and spacer, and show better performance with a thinner glass layer at lower humidity condition. An open circuit voltage, short circuit current and power up to 318 V, 8.3 μA and 427 μW are obtained for a SETEG of 5×5 cm^2 size. Based on the study, a tracking sensor array consisting of nine 5×5 mm^2 SETEGs is proposed and developed. A LabVIEW-based automatic measurement system is also developed to record, process and display the real-time output voltages of the sensing array. Results show that an output voltage up to 4 V can be easily generated when a PDMS-covered stylus touches/slides the sensor array, and the output voltages from different sensors are independent from each other. This work demonstrates the great application potential of the SETEGs sensor array for self-powered detection, tracking or monitoring motion or a touch of a stylus or some objects, thus would be very useful for touch screen display, handheld tracking device, domestic security, traffic monitoring etc.

Graphical abstract