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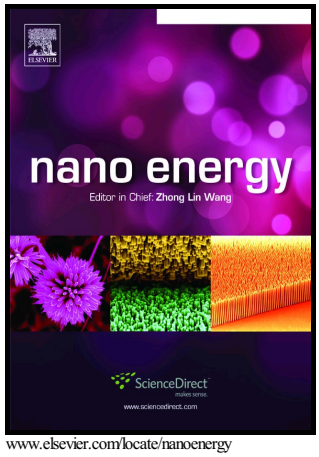

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PII: S2211-2855(18)30397-5
DOI: https://doi.org/10.1016/j.nanoen.2018.06.002
Reference: NANOEN2783

To appear in: *Nano Energy*

Received date: 22 March 2018
Revised date: 1 June 2018
Accepted date: 1 June 2018

Cite this article as: Xiaohu Ren, Huiqing Fan, Chao Wang, Jiangwei Ma, Hua Li, Mingchang Zhang, Shenhui Lei and Weijia Wang, Wind Energy Harvester based on Coaxial Rotatory Freestanding Triboelectric Nanogenerators for Self-powered Water Splitting, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.06.002

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Wind Energy Harvester based on Coaxial Rotatory Freestanding Triboelectric Nanogenerators for Self-powered Water Splitting

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Abstract:

Electrolysis of water is utilized as an environment friendly approach for production of hydrogen (H_2). An external power supply for driving the oxidation or reduction reactions of H_2O molecules is mandatory for electrolysis. Harvesting energy from our living environment for electrolytic water splitting is a cost-effective technology for mass production of H_2. Here, a coaxial rotatory freestanding triboelectric nanogenerator (CRF-TENG) wind energy harvester was demonstrated, in which the electrospinning PVDF nanofibrous membrane served as triboelectric material. And then a fully self-powered water splitting system for hydrogen production was presented based on the CRF-TENG. By scavenging ambient wind energy, the generated electricity is used for water splitting to produce H_2, instead of the external power source. The amounts of H_2 were measured by a gas circulation system and gas chromatograph and the H_2 evolution rates were calculated. When the wind speed is 10 m/s, the hydrogen generation rate reaches 6.9685 μL/min in the 1 M KOH solution, suggesting an easy scale-up and efficient route for converting ambient mechanical energy into hydrogen energy. Such self-powered water splitting system opens up a new road to more energy applications.

Graphical abstract

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