

# Charge storage coating based triboelectric nanogenerator and its applications in self-powered anticorrosion and antifouling

Zhitao Zhang<sup>1,4</sup>, Yupeng Liu (✉)<sup>2,3</sup>, Min Feng<sup>2,3</sup>, Nannan Wang<sup>3,5</sup>,  
Changhe Du<sup>2,3</sup>, Shu Peng<sup>1,4</sup>, Yufei Guo<sup>4</sup>, Yongjian Liu<sup>1,4</sup>, Ying Liu (✉)<sup>1</sup>,  
and Daoai Wang (✉)<sup>2,3</sup>

1 Institute of Materials Science and Engineering, Ocean University of China, Qingdao 266100, China

2 Center of Materials Sciences and Opto-Electronic Technology, University of Chinese Academy of Sciences, Beijing 100049, China

3 State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, China

4 Qingdao Center of Resource Chemistry and New Materials, Qingdao 266100, China

5 Institute of Sustainability for Chemicals, Energy and Environment (ISCE2), A\*STAR, Singapore 138634, Singapore

E-mails: yupengliu@licp.cas.cn (Y.P.L.), liuyingwda@ouc.edu.cn (Y.L.), wangda@licp.cas.cn (D.W.)

## Supplementary material

### Experimental

#### 1. Materials

Nylon 11 (NY 11, 98%, piglet) was purchased from Tianjin Heowns Biochemical Technology. Polyimide (PI) films, poly(ethylene terephthalate) (PET) films, and Cu tape were purchased from a local market. All of the other chemicals used were of analytical grade and used without further purification.

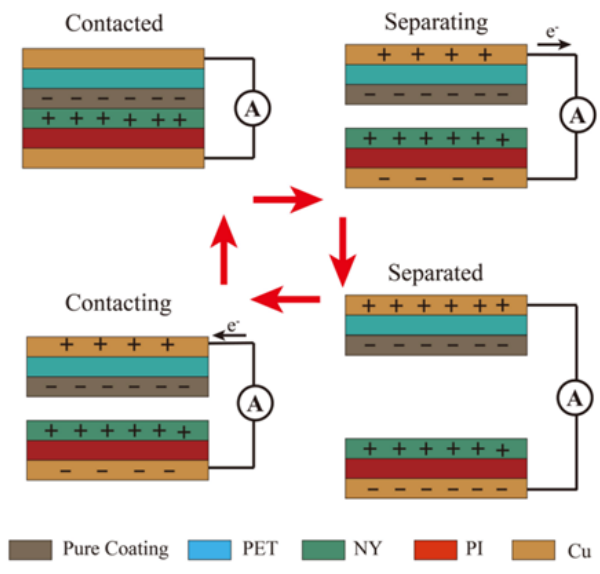
#### 1.2 Characterization

The CHI660e electrochemical workstation (CHI Co., Shanghai, China) that used A3 steel electrodes was employed for electrochemical measurement. A three-electrode system (reference electrode: Ag/AgCl electrode; counter electrode: platinum electrode) was used to record electrochemical parameters. The active area exposed by the working electrode was 1 mm<sup>2</sup>.

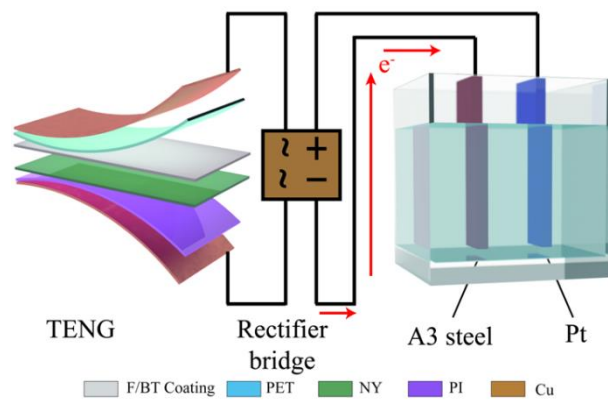
### Results

The alternating current of TENG has been changed into direct current through the rectifier bridge, and connect the A3 steel in the electrolytic cell to the negative electrode of TENG. TENG will lose

electrons during operation and transfer them to the A3 steel. The oxidation reaction of A3 steel is more difficult to occur, and effective cathodic protection is formed.



**Fig. S1** The working mechanism of pure acrylic resin coating-TENG.



**Fig. S2** Structural diagram of the anti-corrosion device of TENG.