Supporting Information

Sb Nanoparticles Decorated with rGO as A New Anode Material in Aqueous Chloride Ion Battery

Qi Zhang[1], R. Karthick[1], Xiliang Zhao[1], Liguo Zhang[1*], Yumeng Shi[2], Linfeng Sun[3], Ching-Yuan Su[4], Fuming Chen[1*]

[1]*Guangdong Provincial Key Laboratory of Quantum Engineering and Quantum Materials, Guangdong Provincial Engineering Technology Research Center for Wastewater Management and Treatment, School of Environment, School of Physical and Communication Engineering, South China Normal University, Guangzhou 510006* *fmchen@m.scnu.edu.cn; zhanglg@scnu.edu.cn*

[2]*International Collaborative Laboratory of 2D Materials for Optoelectronics Science and Technology of Ministry of Education, Engineering Technology Research Center for 2D Material Information Function Devices and Systems of Guangdong Province, College of Optoelectronic Engineering, Shenzhen University, Shenzhen, 518060 China*

[3]*Department of Energy Science, Sungkyunkwan University, Suwon 16419, Korea*

[4]*Graduate Institute of Energy Engineering, National Central University, Tao-Yuan 32001, Taiwan*

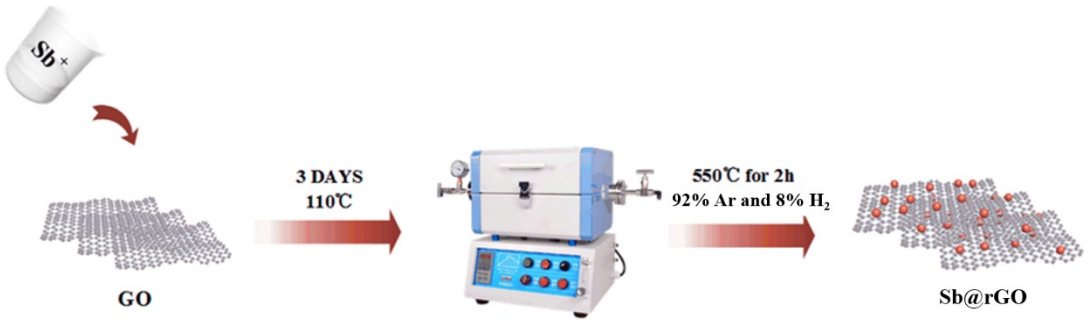

Figure S1 Schematic illustration for the synthesis route of Sb@rGO composite.

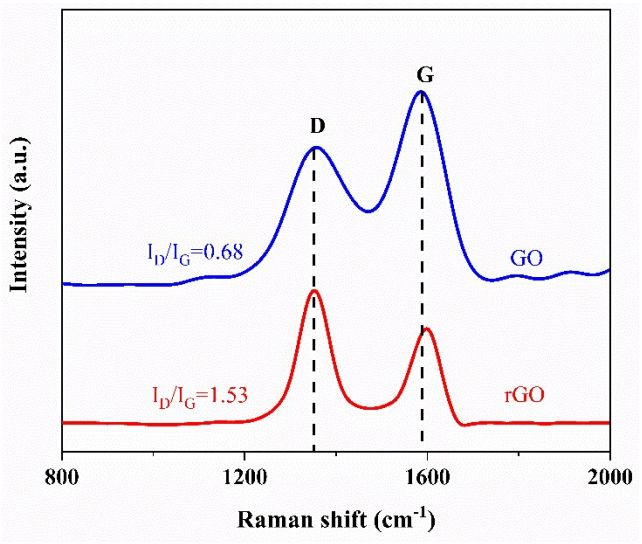

Figure S2. The Raman spectra of GO and rGO.

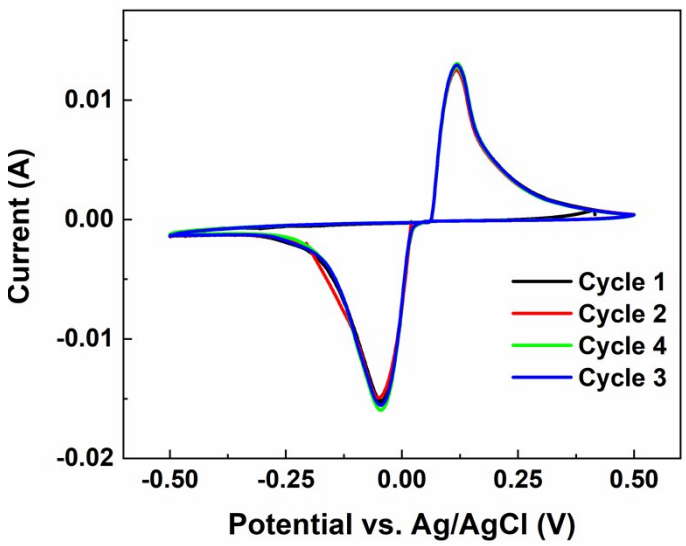

Figure S3. Cyclic voltammetry (CV) curves of the three electrodes in aqueous 1 M NaCl electrolyte (PH = 2), working electrode: AgCl, reference electrode: standard Ag/AgCl electrode, counter electrode: platinum.

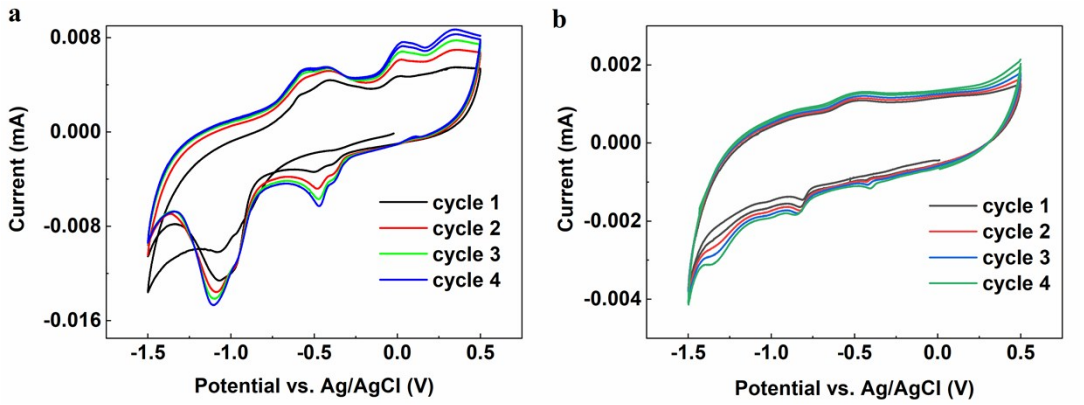

Figure S4 the three-electrode CV curves of Sb@rGO in 1 M NaCl electrolyte at pH=2 (a), and pH=7 (b). Working electrode: Sb@rGO, counter electrode: Pt and reference electrode: Ag/AgCl.

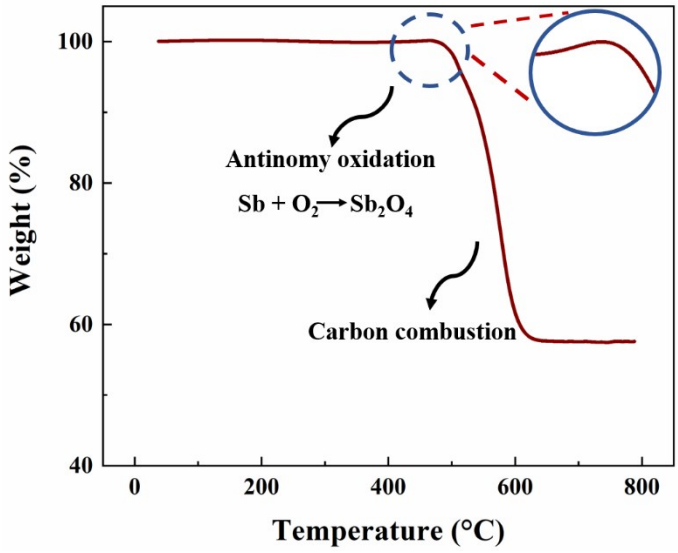

Figure S5. TGA curve of antimony nanoparticles on reduced graphite oxide sheets composites under air atmosphere with a heating rate of 10 ℃ min^{-1}.

To investigate the actual percentage of antimony, thermogravimetric analysis (TGA) was carried out to analyze the Sb@rGO composite under the atmosphere of high purity air with a heating rate of 10 °C min^{-1}. As shown in Figure S2, the curve has a slight mass increase from ~400 °C to 500 °C, which attributed to the immediate oxidation process of Sb and form Sb_2O_4[1]. At the same time, this process is accompanied by the

combustion of carbon[2]. The dominant mass loss about 42.48% between 550 and 610 °C can be associated with the combustion of the rGO sheets and the formation of the Sb_2O_4. According to the TG curve, the lowest platform of mass retention is described as the content of Sb_2O_4. From that, the content of Sb can be calculated as 45.77%.

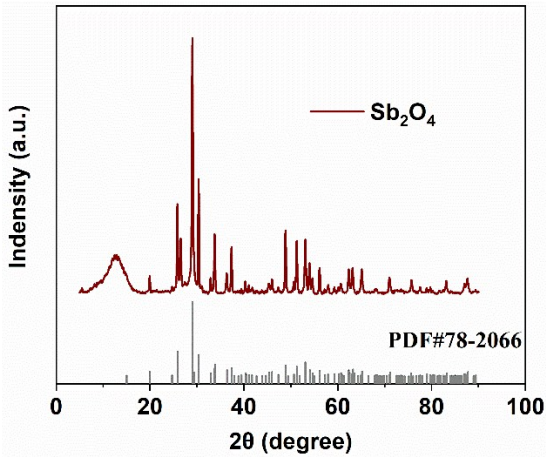

Figure S6. The XRD diffraction pattern of the product after Sb@rGO TGA test.

Reference

1. L. Wu, X. Hu, J. Qian, F. Pei, F. Wu, R. Mao, X. Ai, H. Yang and Y. Cao, *Energy Environ. Sci.*, 2014, **7**, 323-328.
2. Z. Liu, X.-Y. Yu, X. W. Lou and U. Paik, *Energy & Environmental Science*, 2016, **9**, 2314-2318.