**Supplementary Information**

# Enhanced electrocatalytic performance of nickel diselenides grown on graphene toward the reduction of triiodide redox couples

Xiao Zhang[a], Haijun Zhang[a], Xingyu Wang[a], Xiaomeng Zhou[a,*]

[a]*Center forAircraft Fire and Emergency, Civil Aviation University of China, Tianjin 300300, P. R. China*

* Corresponding author.

*E-mail address*: zhouxm@nankai.edu.cn (X.M. Zhou).

**Synthesis of GO nanosheets.** In detail, graphite powder (2 g) was put into 100 mL cooled (0 °C) concentrated $H_2SO_4$. Following the slow addition of $KMnO_4$ (6 g), a slight exotherm may be produced in this process. The suspension was then stirred at 35 °C for 12–15 hours. Afterwards, 200 mL of distilled water was added and the temperature was kept at 96 °C for 2 h. The temperature was reduced to 60 °C, and $H_2O_2$ (30%, 10 mL) was injected into the suspension to completely react with the excess $KMnO_4$, which yielded a bright yellow mixture. The solid product was separated by centrifugation, and then washed with HCl (5 %) several times and with water until the pH value of the supernatant was nearly 6, and graphene oxide was obtained. The collected precipitate was dispersed in water, then sonicated and subsequently concentrated to obtain a GO suspension, and kept at 50 °C for 10 h and GO powder was obtained.

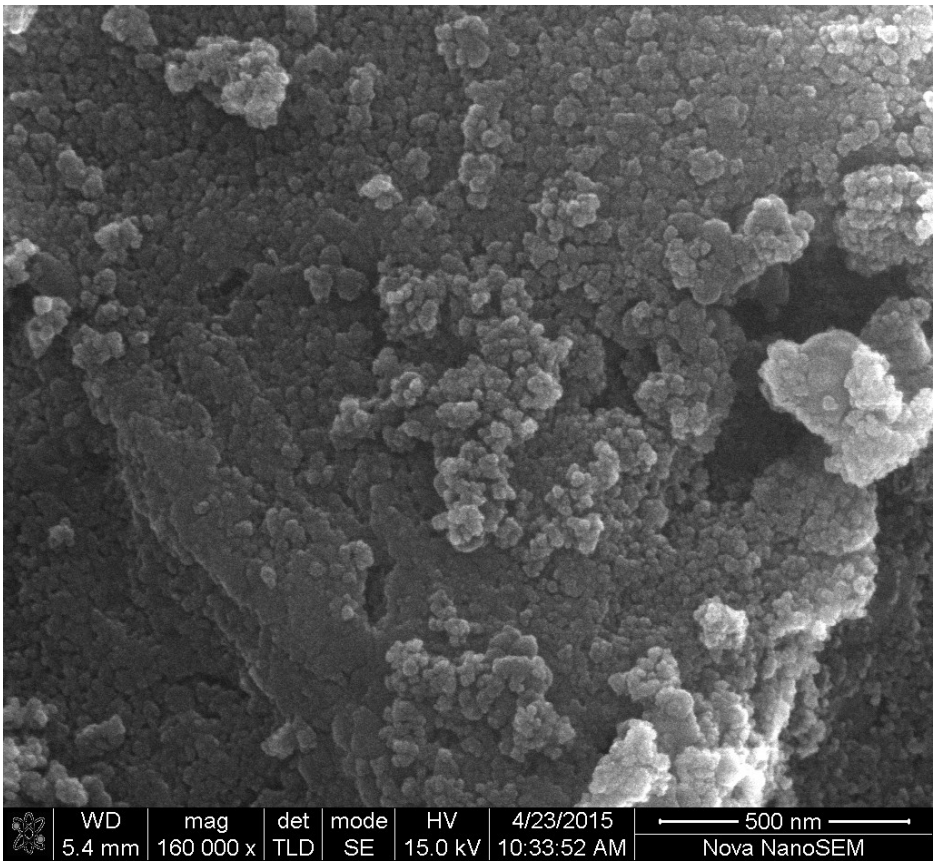


**Fig. S1** SEM image of the $NiSe_2$ NPs.

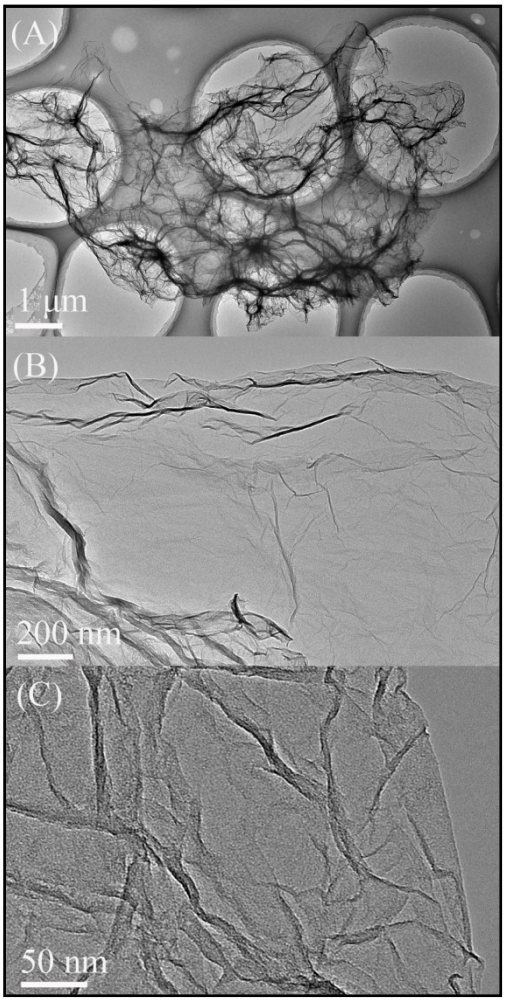


**Fig. S2** SEM and TEM images of graphene at different magnifications.

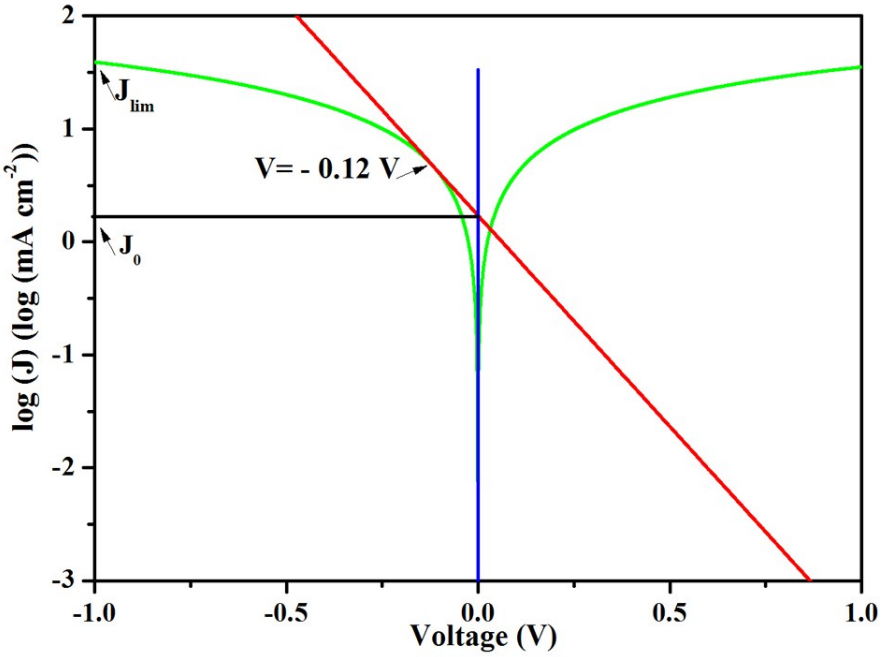


**Fig. S3** Annotations of getting $J_0$ and $J_{lim}$ from the Tafel curves.

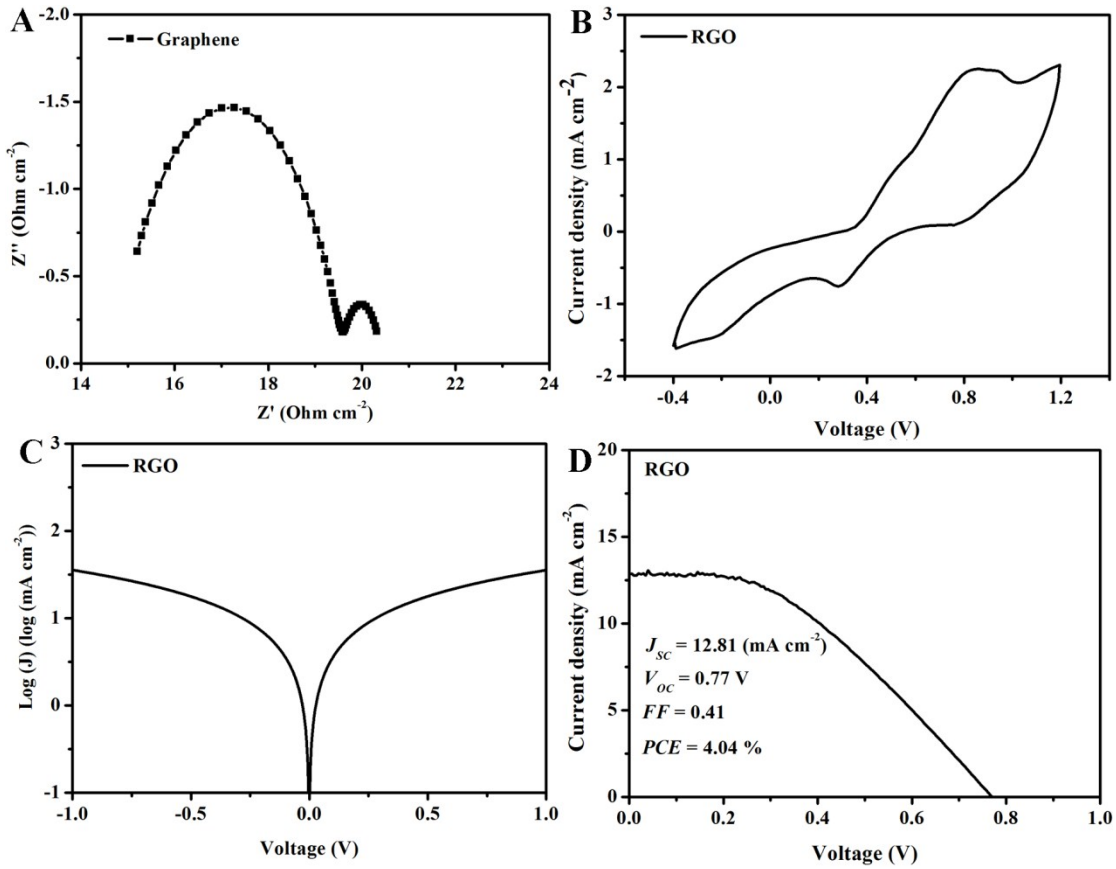


**Fig. S4** Nyquist plots (A), Cyclic voltammograms (B), Tafel polarization curves (C) and photocurrent density-voltage curves (D) of RGO.