Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Hydrothermal synthesis of MnOOH/three dimensional reduced graphene oxide composite and its electrochemical properties for supercapacitors

Shumin Sun*, Shen Wang, Tongchi Xia, Xiaofeng Li, Qingxian Jin, Qiong Wu, Lizhen Wang, Zhenhua Wei, Peiyuan Wang*

Henan Provincial Key Laboratory of Surface and Interface Science, Zhengzhou University of Light Industry, Zhengzhou 450002, China. Tel: +86-371-86609676; E-mail: smsun@zzuli.edu.cn; peiyuanwang@zzuli.edu.cn

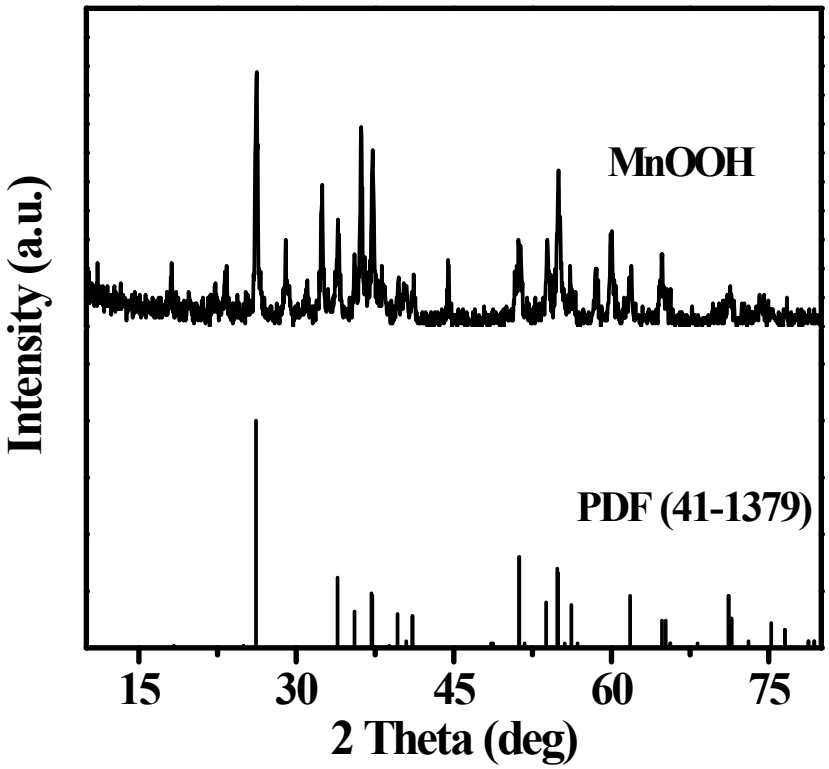

Fig. S1 XRD pattern of MnOOH

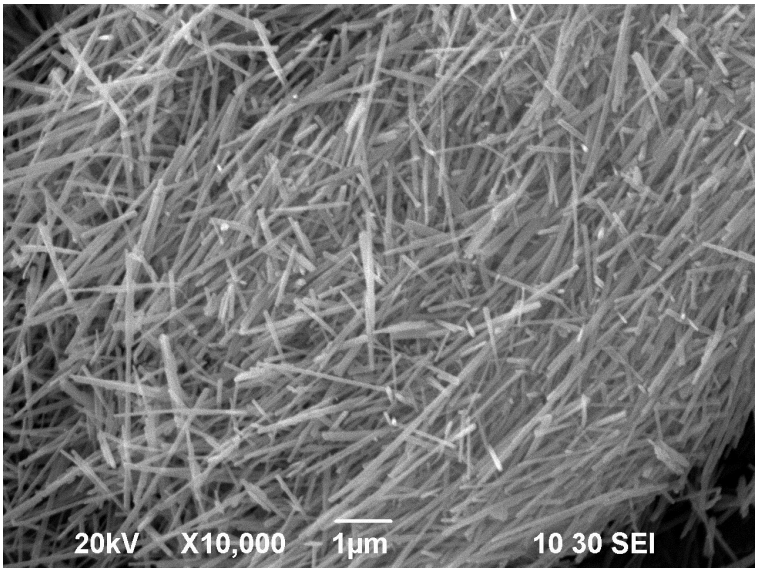

Fig. S2 SEM image of MnOOH

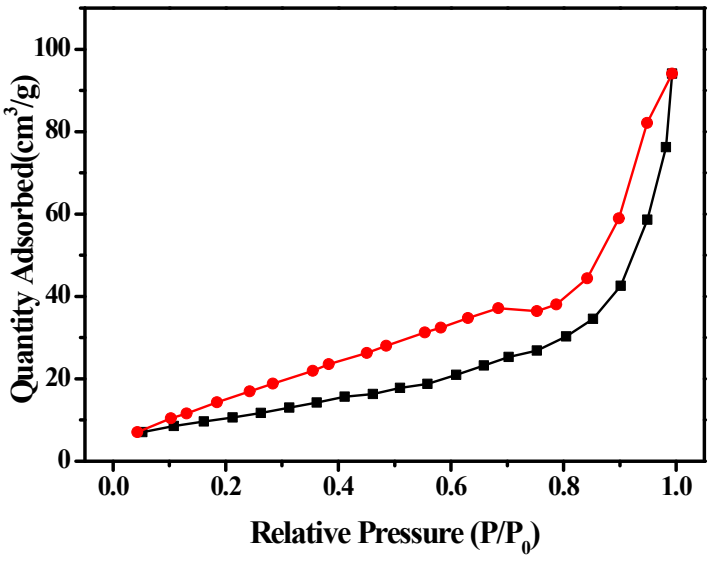

Fig. S3 Nitrogen sorption isotherm of MnOOH/3D-rGO composite

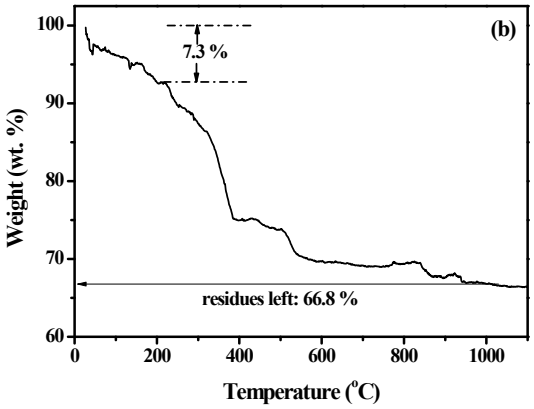

Fig. S4 TG analysis of MnOOH/3D-rGO composite.

The 3D-rGO content is 15.6 % according to the TG results. The weight loss of 7.3% between 30 and 200 °C in MnOOH/3D-rGO (Fig. S4) may be resulted from the loss of physisorbed and chemisorbed water [1]. According to the literature [2], all oxides and hydroxides of manganese can be transformed to Mn_3O_4 if heated in air to about 1000 °C. It is reasonable to assume that the residue of 66.8% at 1000 °C can be attributed to pure Mn_3O_4. Then, the weight content of the MnOOH in the composite can be calculated as 77.1% based on the law of conservation of mass. Based on the above analyses, the weight content of rGO can be estimated to be 15.6% (100%-77.1%-7.3%=15.6%).

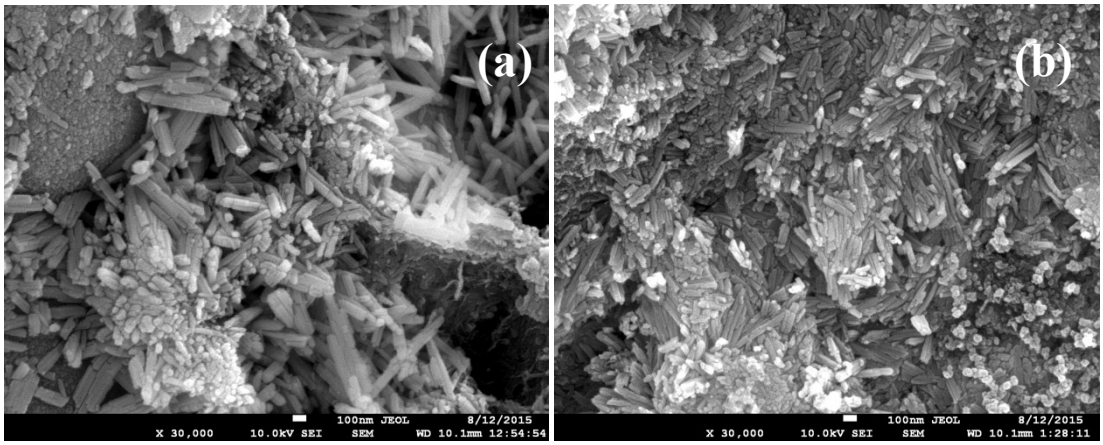

Fig. S5 SEM images of fresh (a) and used electrode (b)

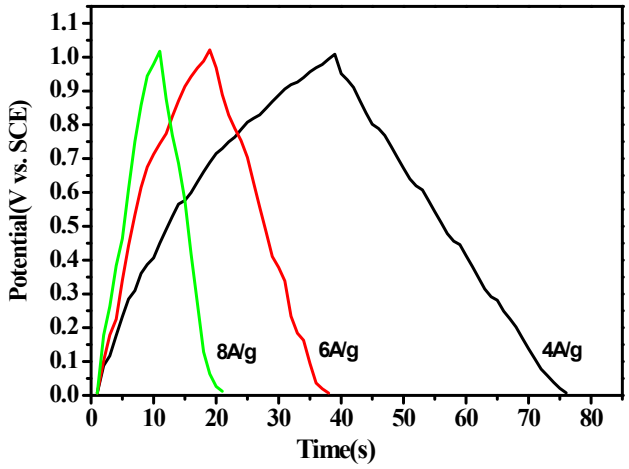

Fig. S6 Galvanostatic charge–discharge curves of the MnOOH/3D-rGO at different current densities

References

1. H. Fang, S. C. Zhang, X. M. Wu, W. B. Liu, B. H Wen, Z. J. Du and T. Jiang, *J. Power Sources*, 2013, **235**, 95-104.

2. T. E. Moore, M. Ellis and P. W. Selwood, *J. Am. Chem. Soc.*, 1950, **72** ,856-866.