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Electronic Supplementary Information (ESI)

Three-Dimensional Graphene Hydrogels Supported Ultrafine RuO_2 Nanoparticles for Supercapacitor Electrodes

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1. Photograph of RuO_2/RGO composite

Fig S1 the photograph of RuO_2/ RGO composite

Fig S1 shows the shape of the RuO_2/RGO composite. As seen from the Photographs, with the increase of RuO_2 content in the composite, the product was no longer cylindrical shape.

2. TG analyses of RuO_2/RGO composite

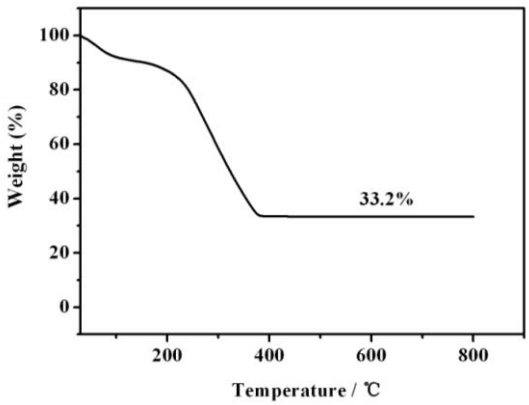

Fig S2 TG curves of the RuO_2 / RGO

Fig S2 shows the TG curves of the RuO_2/RGO composite. On the TG curves, two steps of weight loss are found. The first step occurs at near 100 ℃, which is due to evaporation of physically adsorbed water. The large weight loss at about 350 ℃ is attributed to the removal of RGO from the composites. After 400 ℃, the TG traces

are stable with no further weight loss, indicating the RGO completly removed from the composites. The estimations based on the TG curves indicate that mass ratio of the RuO_2 in the composite is 33.2%.

3. SEM of RuO_2/RGO composite (the mass ratio of the RuO_2 in the composite is 33.2%)

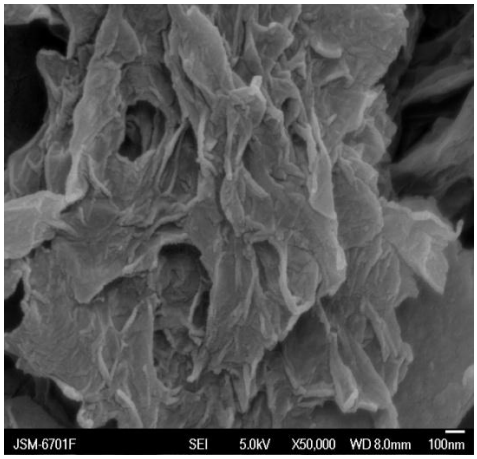

Fig S3 FESEM images of RuO_2/RGO composite

4. XPS of the RuO_2-15%/RGOH

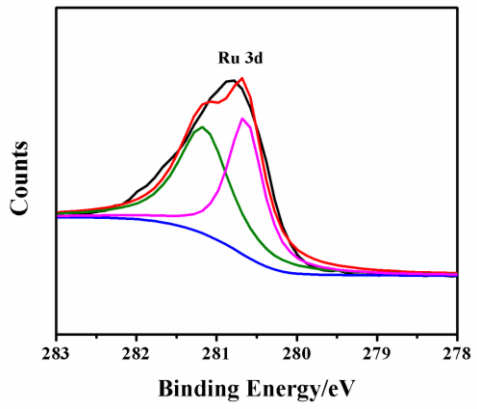

Fig S4 XPS of the RuO_2-15%/RGOH

Fig. S4 shows the peak fitted XPS spectra of Ru 3d peaks obtained from the RuO_2-15%/RGOH. Spectrum displays the characteristic shape of the Ru3d doublet,

which exhibits two relatively narrow peaks corresponding to the 5/2 and 3/2 spin orbit components. Moreover, the Ru 3d 5/2 peak, which does not overlap with Ru 3d 3/2 and C1S peaks appears at 281.0 eV, which corresponds to the binding energy of Ru^{4+} and suggests the presence of RuO_2 in the composites[3].