Supporting Information

Galvanic replacement mediated synthesis of rGO-Mn_3O_4-Pt nanocomposites for oxygen reduction reaction

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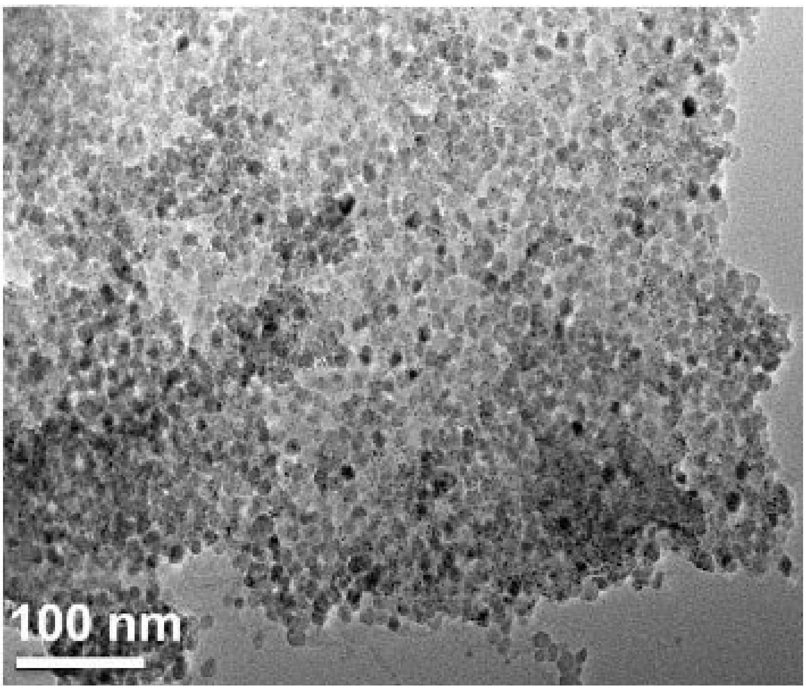

Fig. S1. TEM image of rGO-Mn_3O_4-Pt-1.

Fig.S2 HR-TEM image of the rGO-Mn_3O_4-Pt-1 nanocomposites

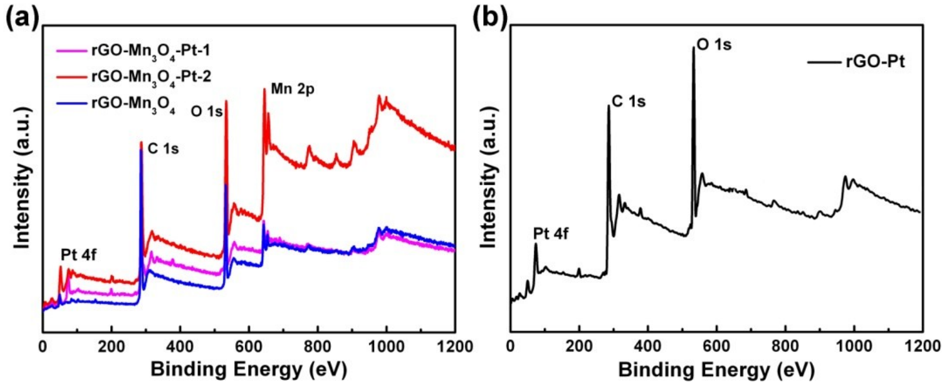

Fig. S3 (a) XPS survey spectra of rGO-Mn_3O_4, rGO-Mn_3O_4-Pt-1, rGO-Mn_3O_4-Pt-2, (b) XPS survey spectra of rGO-Pt.

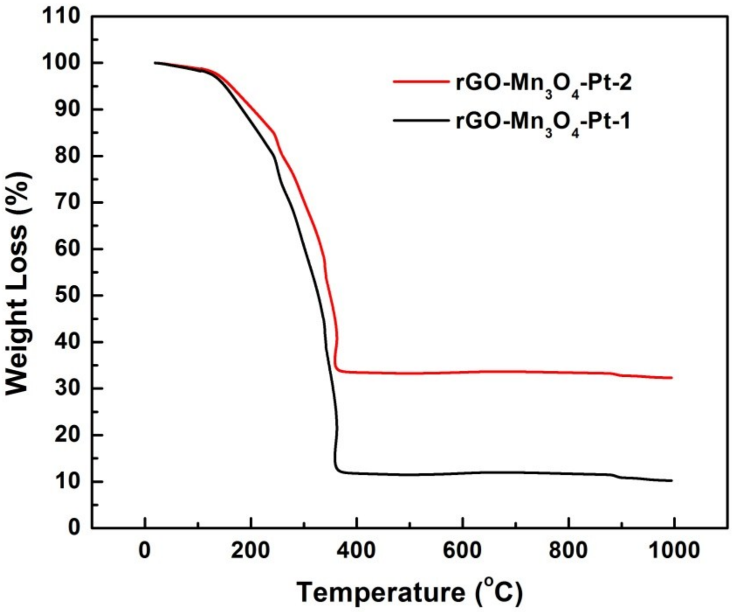

Fig. S4 Thermogravimetric (TG) curves of the two rGO-Mn_3O_4-Pt samples after strong acid washing, where Mn_3O_4 was completely removed before analysis. The experiment was carried out in air atmosphere.

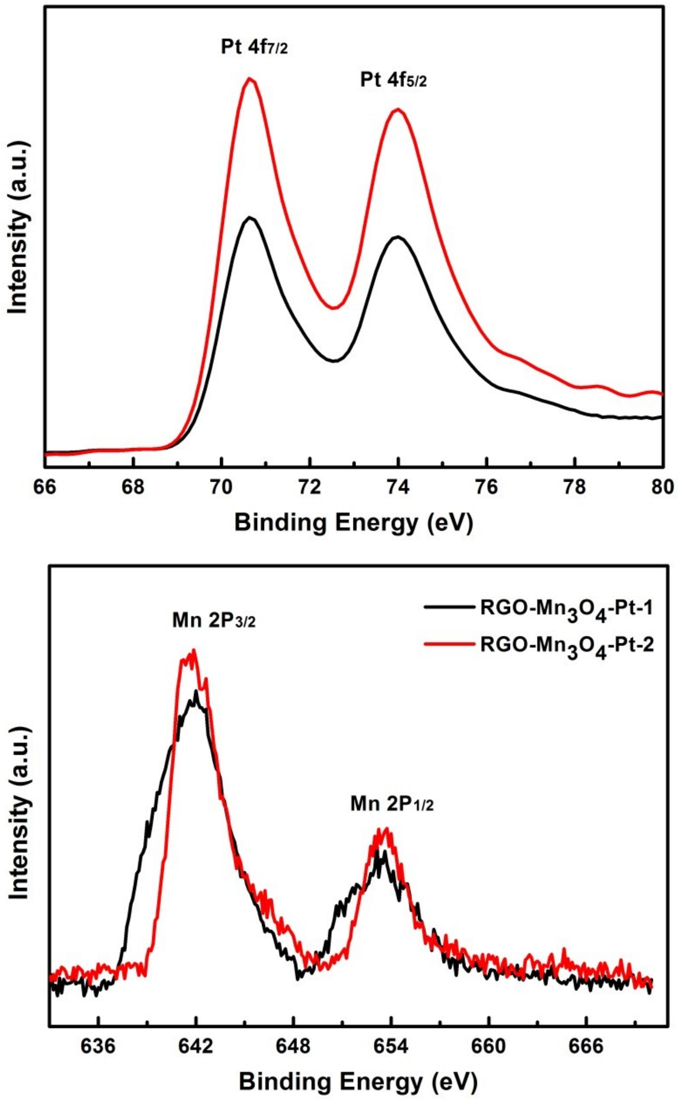

Fig. S5 Pt 4f and Mn 2p XPS spectra of the two rGO-Mn_3O_4-Pt samples. Pt $4f_{7/2}$ and Pt $4f_{5/2}$ peaks at 71 eV and 74.3 eV in the Pt 4f XPS spectra of both rGO-Mn_3O_4-Pt nanocomposites are typical for zero-valent Pt. Mn 2p spectra display two peaks at 641.5 and 653.2 eV corresponding to Mn $2p_{3/2}$ and Mn $2p_{1/2}$, respectively, an indication that the obtained manganese oxide still exists as Mn_3O_4.

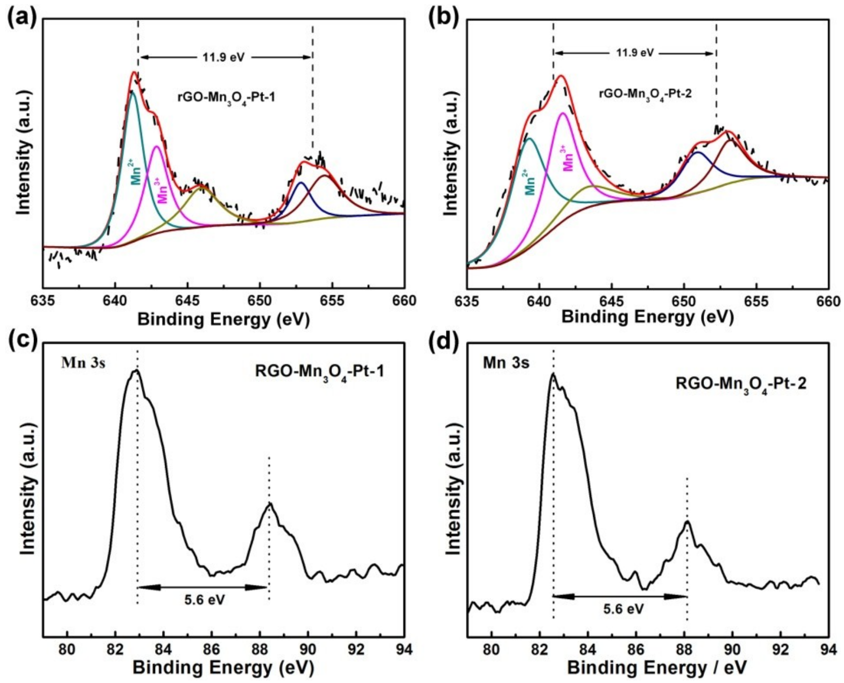

Fig. S6 The high-resolution XPS spectrum of Mn 2p for (a) rGO-Mn_3O_4-Pt-1 and (b) rGO-Mn_3O_4-Pt-2, XPS survey spectra of Mn 3s for (c) rGO-Mn_3O_4-Pt-1 and (d) rGO-Mn_3O_4-Pt-2.

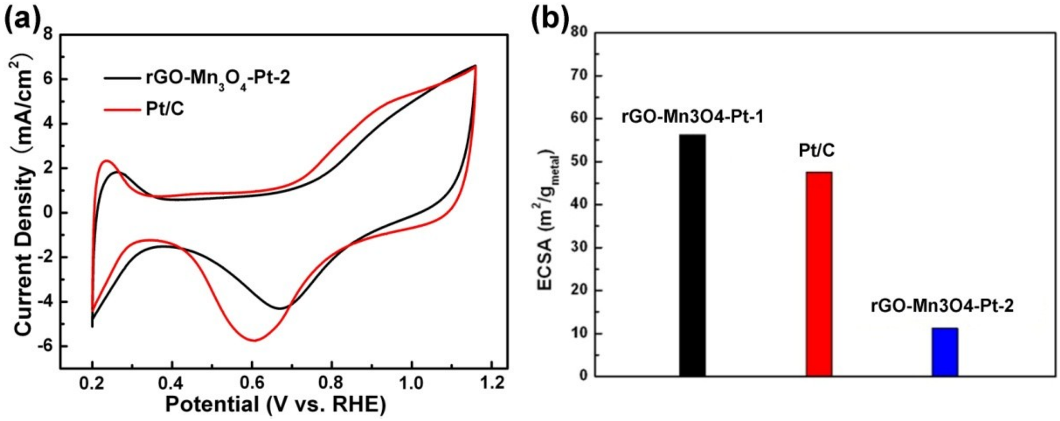

Fig. S7 (a) CV curves of rGO-Mn_3O_4-Pt-2 nanocomposites and commercial Pt/C in N_2-saturated 0.1 M KOH solution at a scanning speed of 50 mV · s^{-1}, (b) Specific ECSAs for rGO-Mn_3O_4-Pt-2, rGO-Mn_3O_4-Pt-2, and commercial Pt/C.

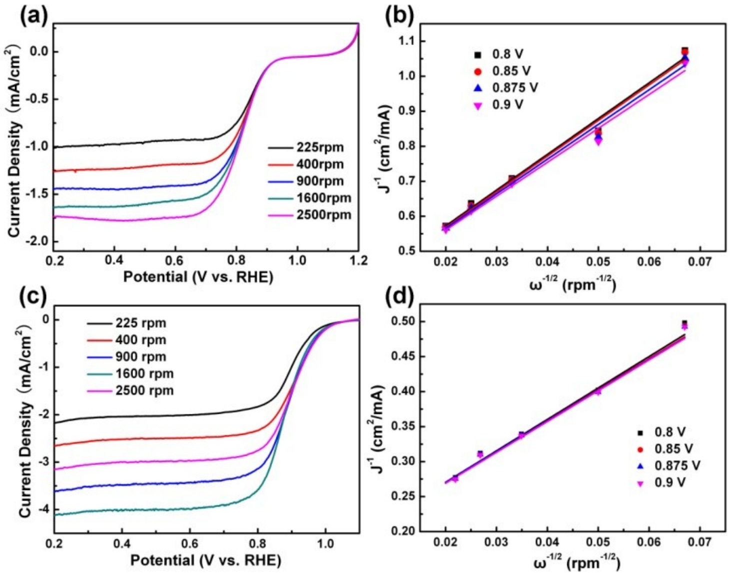

Fig. S8 (a) LSV curves of ORR over rGO-Mn_3O_4-Pt-2 in O_2-saturated 0.1 M KOH solution at different rotation rates, (b) is the corresponding Koutecky-Levich plots derived from the LSV curves; (c) LSV curves of ORR over commercial Pt/C catalysts in O_2-saturated 0.1 M KOH solution at different rotation rates, (b) is the corresponding Koutecky-Levich plots derived from the LSV curves