Supplementary Information

Highly Efficient Electrocatalytic Performance Based On Pt Nanoflowers Modified Reduced Graphene Oxide/Carbon Cloth Electrode

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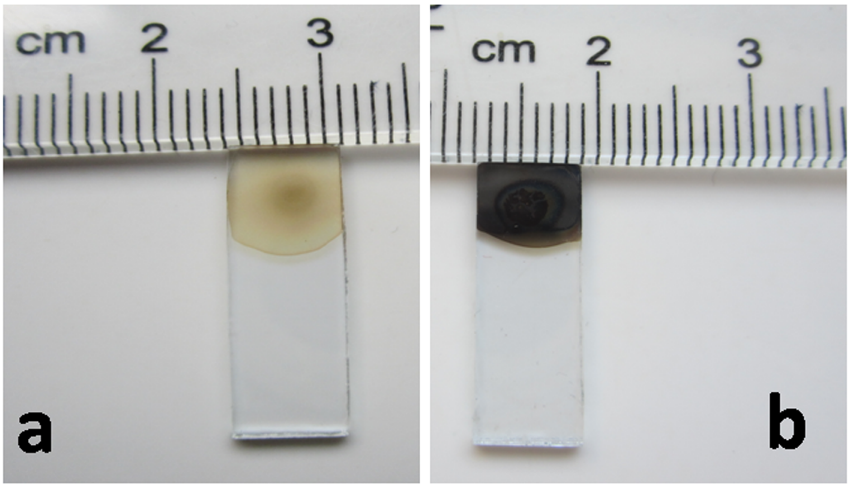

Fig. S1. The photograph of GO nanosheets solution dried on the ITO substract (a) and electrochemical reduction GO supported on ITO (b).

Due to it is difficult to observe the change of the color during the electrochemistry reduction due to the darkness of the carbon cloth, we employed a similarly electrochemistry reduction experiment wherein a clean and transparent ITO glass was supported GO. As shown in Fig. S1a, GO was dropped on the ITO glass presents yellow, as the electrochemistry reduction process going, the color of GO/ITO gradually turn dark, after 2000 s electrodeposition in Na-PBS solution, the color of the GO has turned black, which confirms the GO was reduced, as shown in the Fig. S1b.

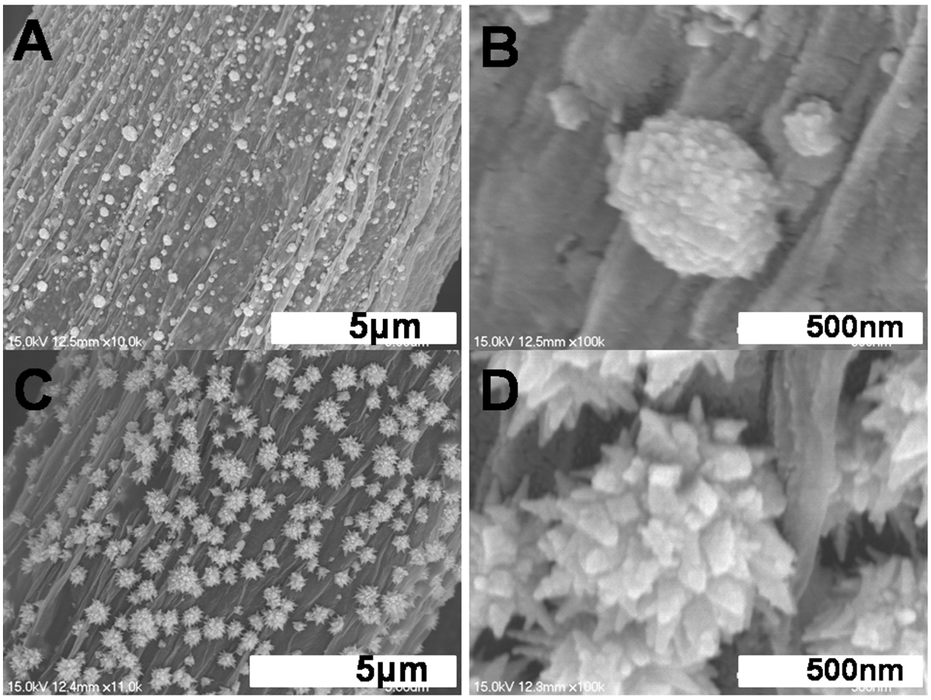

Fig. S2. Typical SEM images of Pt-nanostructures electrodeposited on RGO/CC at -0.2 V in 3.0 mM H_2PtCl_6 + 0.5 M H_2SO_4 electolyte for 200 s (A) and the corresponding higher magnification (B), for 400 s (C) and the corresponding higher magnification (D)

The Pt nanoflowers shaping was characterized by time-coursed SEM measurement (Fig. S2). It was found that the quasi-spherical particles were initially formed at the earlier 200 s (Fig. S2A and Fig. S2B), which acted as the nuclei for subsequently shaping Pt nanoflowers. When the deposition time reached to 400 s, these perfect Pt nanoflowers (Fig. S2C and Fig. S2D) with many pricks were formed on the surface of the RGO/CCE.

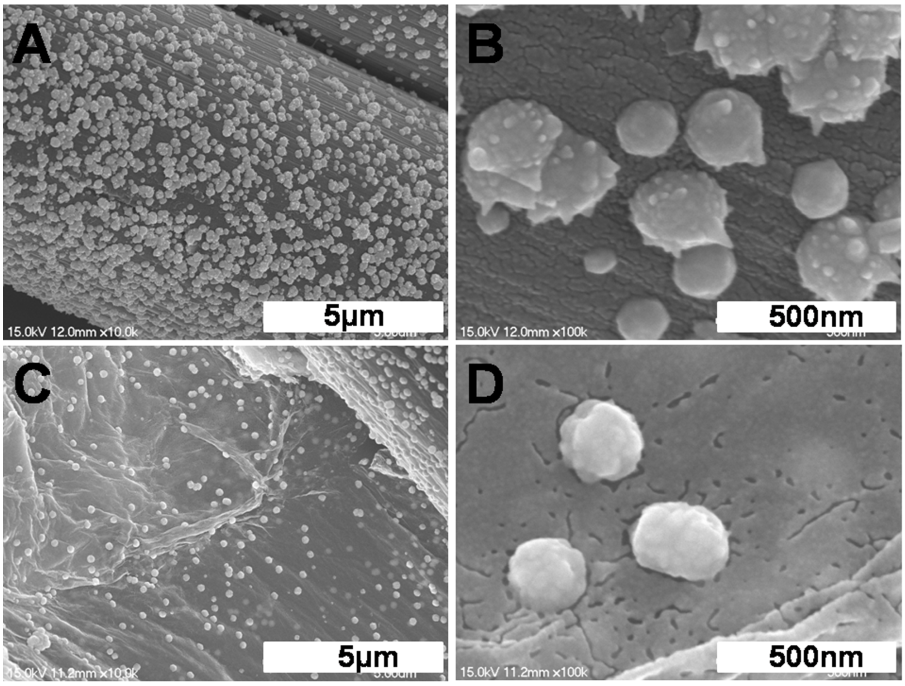

Fig. S3. Typical SEM images of Pt-nanoparticles electrodeposited at -0.2 V in 3 mM H_2PtCl_6 + 0.1 M KCl electolyte on CCE (A) and the corresponding higher magnification (B), on RGO/CCE (C) and the corresponding higher magnification (D).

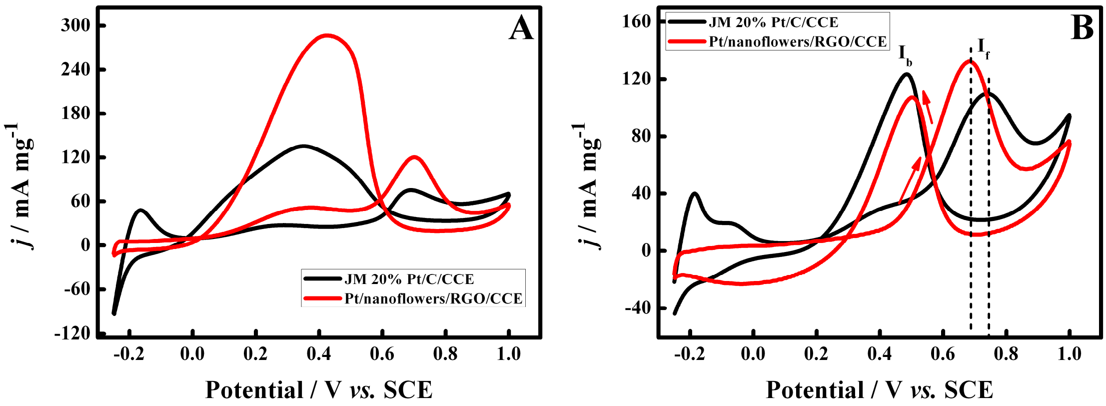

Fig. S4. CVs of JM 20% Pt/C/CCE and Pt-nanoflowers/RGO/CCE in 0.5 M H_2SO_4 + 0.5 M HCOOH (A) and in 0.5 M H_2SO_4 + 1 M CH_3OH (B).

For JM Pt/C/CC electrode, commercial JM 20 wt% Pt/C (2 mg) from Johnson Matthey were dispersed in Nafion water solution (2 mL) under ultrasonic stirring. After that, the catalyst ink (56 μL) was dropped by injector onto the surface of CC electrode (0.2 cm^2) and dried in air.

On Pt-nanoflowers/RGO/CCE, the current densities of formic acid and methanol electro-oxidation were both higher than those on JM 20% Pt/C/CCE. And shown in Fig. 1B, the oxidation peak current density of methanol on Pt-nanoflowers/RGO/CC electrode is lowered about 60 mV relative to that on JM 20% Pt/C/CCE. The I_f/I_b ratio of the Pt-nanoflowers/RGO/CCE is calculated to be 1.25, which is higher than the value of JM 20% Pt/C/CCE (0.88).