Supporting Information

Enhanced photoelectrochemical water oxidation performance of hematite photoanode by decorating with Au-Pt core-shell nanoparticles

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Preparation of the Au/α-Fe_2O_3 photoanodes

The same spin-coating process was utilized to integrate the Au nanopartipcles with α-Fe_2O_3 photoanodes. Briefly, 0.2 mL of Au sol was dipped onto the α-Fe_2O_3 photoanodes, and spin coated at 3000 rpm for 10 s, followed by drying at 60 ^oC to evaporate water. The spin-coating and drying process were duplicated 25 times, followed by roasting at 120 ^oC 20 min to increase the adhesion between the Au nanopartipcles and α-Fe_2O_3 photoanodes.

Preparation of the Pt/α-Fe_2O_3 photoanodes

The Pt/Fe_2O_3 photoanodes were synthesized by in-situ reduction method. Typically, 0.3 mL 9.7 mM H_2PtCl_6 solution was dropped to the Fe_2O_3 photoanodes surface, then 0.3 mL 0.1 M ascorbic acid solution was added, followed by drying at 60 ^oC to evaporate water. This process was duplicated 5 times. The Pt/Fe_2O_3 photoanodes were rinsed several times with ethanol and deionized water.

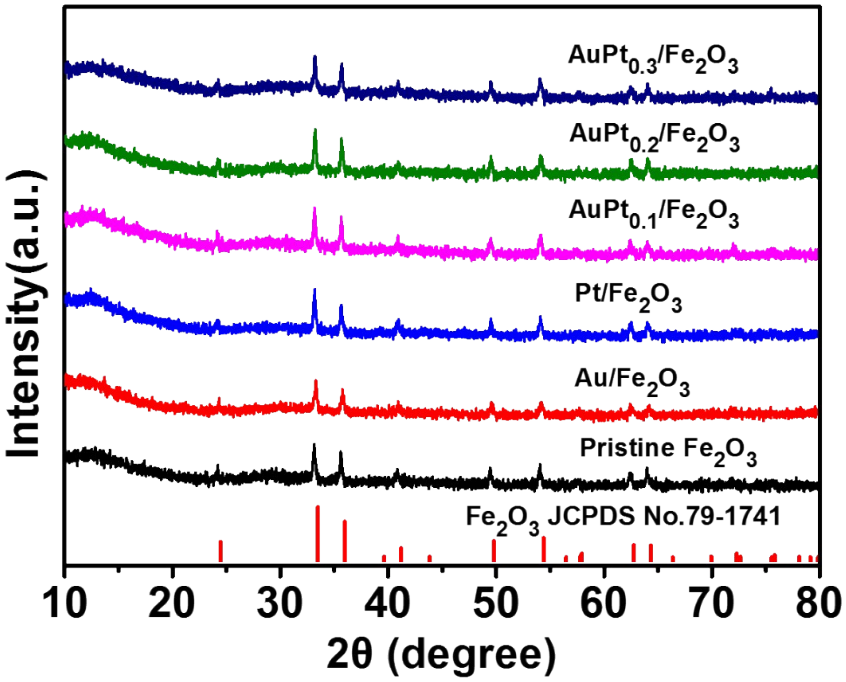

Fig S1. The XRD patterns of the as- prepared samples.

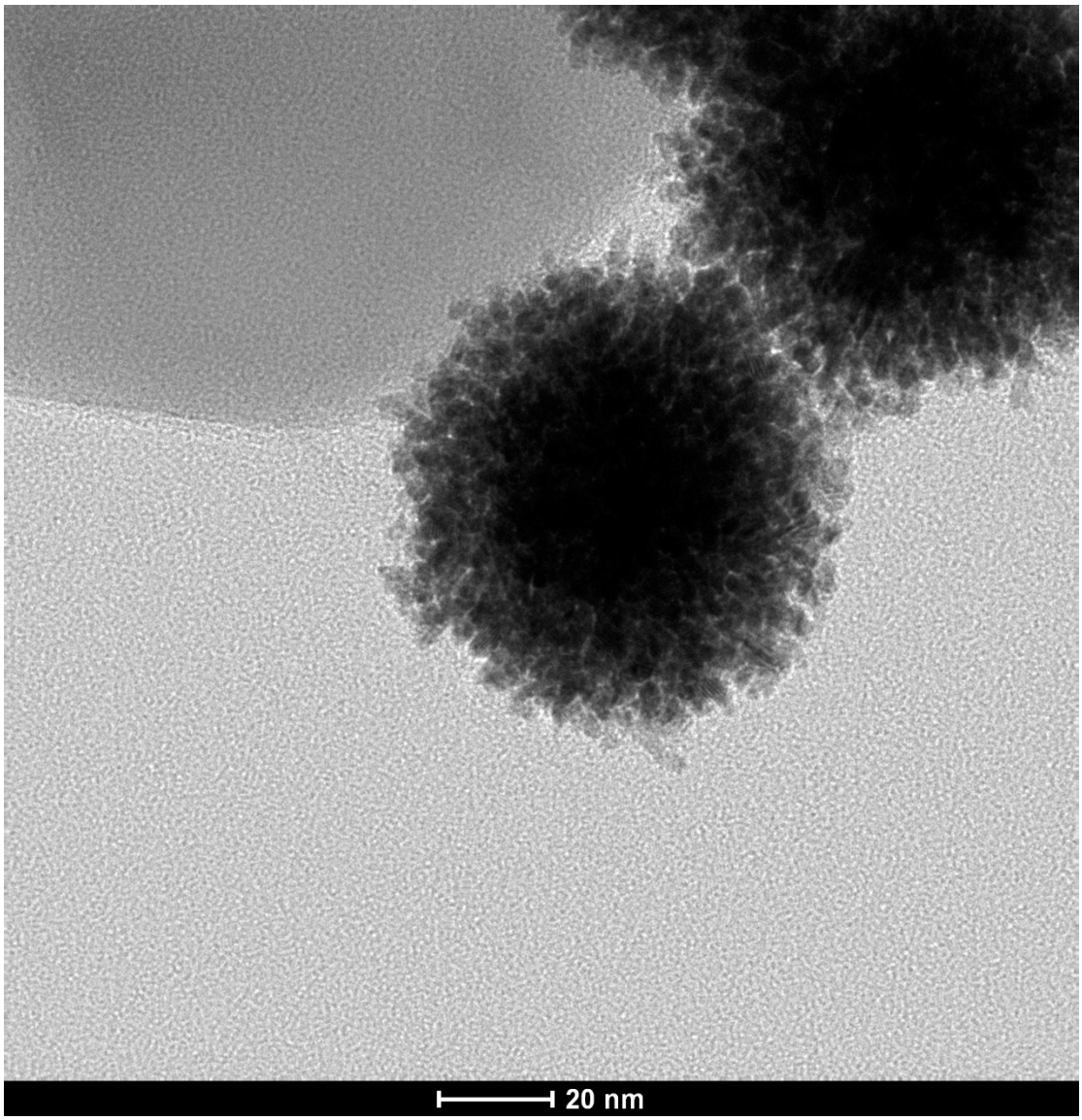

Fig S2. The TEM image of Au-Pt core-shell nanoparticles.

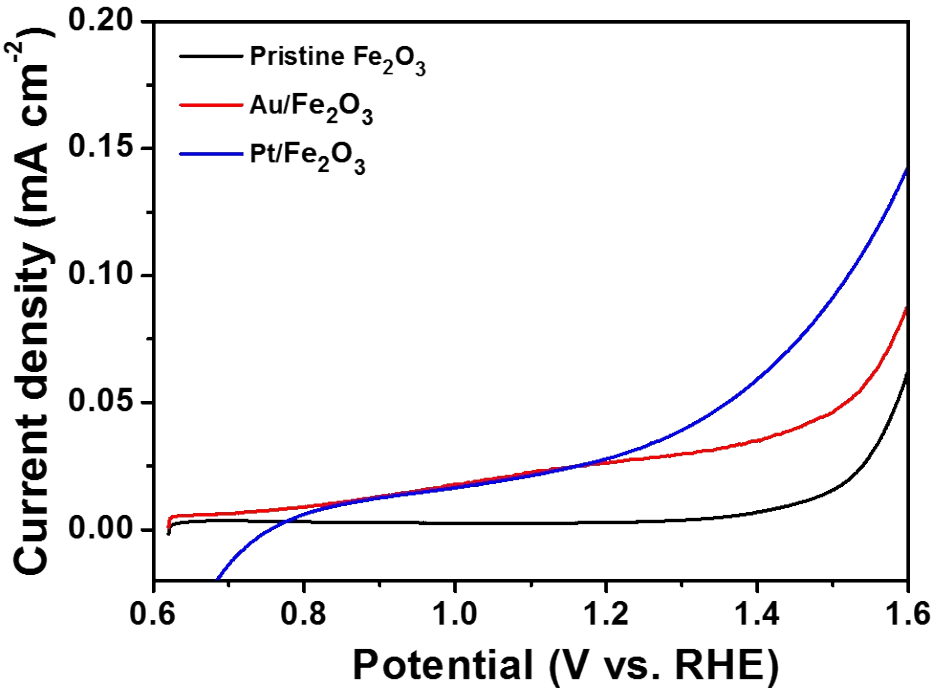

Fig. S3 Current–potential (*I–V*) characteristic curves of the pristine Fe_2O_3, Au/Fe_2O_3, Pt/Fe_2O_3.

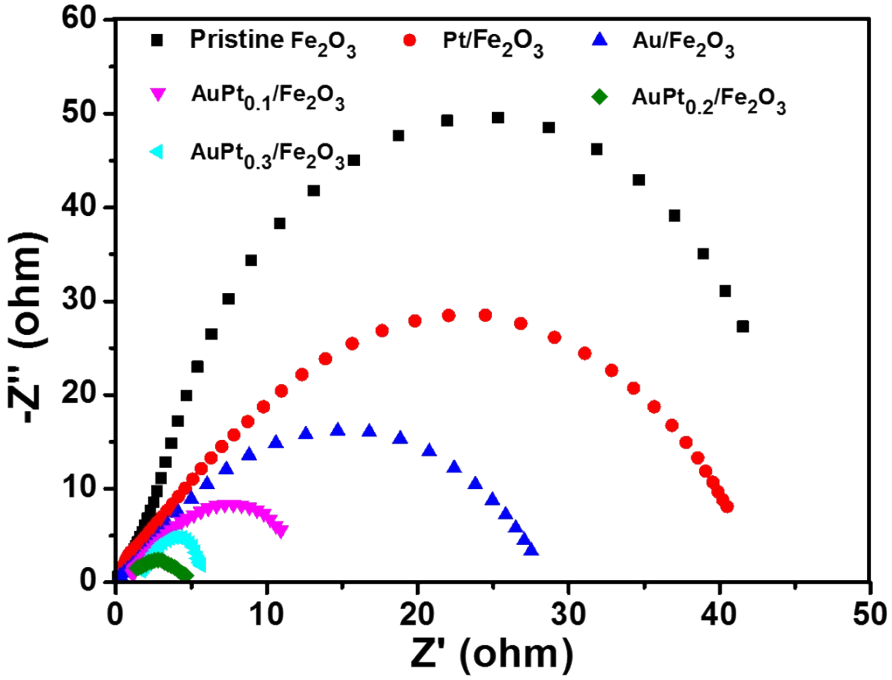

Fig S4. EIS spectra of as- prepared samples.

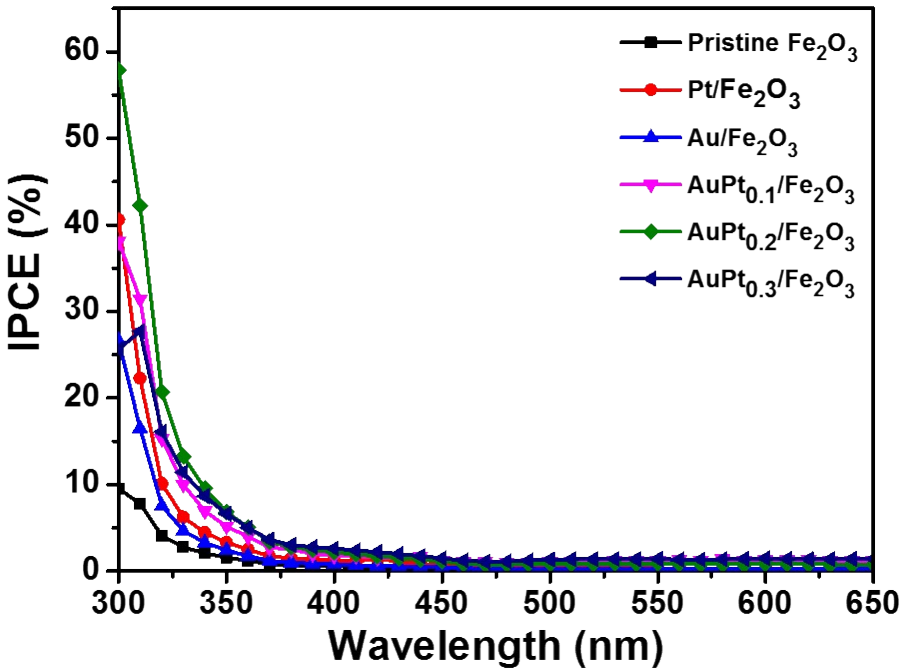

Fig. S5 Incident photonto-current efficiency (IPCE) at 1.23 V *vs.* RHE under monochromatic irradiation (300 -600 nm) for as-prepared photoanode.