Preparation of well-dispersive PdAu bimetallic nanoparticles on reduced graphene oxide sheets with excellent electrochemical activity for ethanol oxidation

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Supplementary Information

The electrochemical experiment results of PdAu/CRG and Pd/CRG

Fig. S1 is cyclic voltammograms of PdAu/CRG, Pd/CRG and PdAu/CRG in 1 M KOH+1 M CH_3CH_2OH at a scan rate of 50 $mV•s^{-1}$. It can be seen that there is no obvious current of Au/CRG for ethanol oxidation, indicating that Au is inactive for ethanol oxidation in alkaline media. The onset potential of the faradaic current (E_{onset}) and the forward peak current (I_f) for ethanol oxidation on PdAu/CRG and Pd/CRG are shown in Table S1. Obviously, the value of E_{onset} for ethanol oxidation on the PdAu/CRG electrode is about 120 mV more negative than that on Pd/CRG. The value of I_f on the PdAu/CRG is 2.5 times as high as that on the Pd/CRG. The results show that PdAu/CRG exhibit higher electrocatalytic activities for ethanol oxidation than Pd/CRG.

Fig. S2 is chronoamperometric curves of PdAu/CRG, Pd/CRG and PdAu/CRG for ethanol electrooxidation at -0.3 V in nitrogen-saturated 1 M KOH+1 M CH_3CH_2OH solution. The pseudo-steady currents at 3600 s (I_s) of chronoamperometric experiment for the PdAu catalysts are shown in Table S1. I_s value of PdAu/CRG is 14 times higher than that of Pd/CRG. Obviously, the electrochemical stability of PdAu/CRG is much better than that of Pd/CRG.

All these results show that presence of Au in Pd catalysts could improve the catalytic activity as well as the resistance to poisoning for ethanol oxidation in alkaline media.

Table and Figure Captions:

Table S1 Loading of metal particles, E_{onset}, I_f and I_s of ethanol electrooxidation on PdAu/CRG, Pd/CRG and Au/CRG.

Fig. S1 Cyclic voltammograms of PdAu/CRG, Pd/CRG and Au/CRG in 1 M KOH+1 M CH_3CH_2OH at a scan rate of 50 $mV·s^{-1}$.

Fig. S2 Chronoamperometric curves of PdAu/CRG, Pd/CRG and Au/CRG for ethanol electrooxidation at -0.3 V in nitrogen-saturated 1 M KOH+1 M CH_3CH_2OH solution.

Table S1

Catalyst	loading of metal particles($\mu g \cdot cm^{-2}$)	I_f ($mA \cdot mg^{-1}$)	E_{onset} (V vs SCE)	I_s ($mA \cdot mg^{-1}$)
PdAu/CRG	37.95	1566	-0.768	216.2
Pd/CRG	44.60	634	-0.644	14.4
Au/CRG	22.43	-	-	-