Supplementary Materials: Hydrothermal Method Using DMF as a Reducing Agent for the Fabrication of PdAg Nanochain Catalysts towards Ethanol Electrooxidation

Yue Feng, Ke Zhang, Bo Yan, Shumin Li, Yukou Du

In order to investigate the effect of Ag content on the final as-prepared catalysts, we synthesized the PdAg catalysts with different molar ratios between the Pd and Ag elements. The catalytic activity of the as-prepared PdAg catalysts was detected by cyclic voltammetry in a 1.0 M C_2H_5OH/1.0 M KOH solution. The CV results have been recorded in Figure S1. As seen clearly in Figure 1, the forward peak current densities of ethanol oxidation are in the following order: Pd_1Ag_1 > Pd_2Ag_1 > Pd_3Ag_1 > $Pd_{0.5}Ag_1$. This result suggests that the moderate addition of Ag can enhance the catalytic activity of the Pt catalyst to ethanol electrooxidation. Meanwhile, the result also shows that Pd_1Ag_1 has the highest catalytic activity, demonstrating that Pd:Ag = 1:1 is the optimum molar ratio for the PdAg composite catalyst.

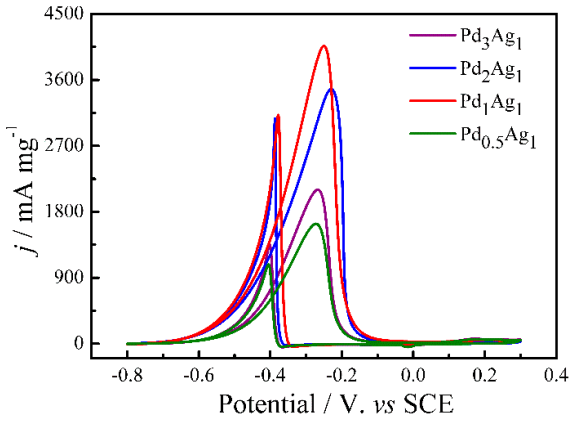

Figure S1. Cyclic voltammograms PdAg catalysts with different molar ratios in 1.0 M C_2H_5OH/1.0 M KOH solution with scan rate of 50 mV s^{-1}.

To know the evolution mechanism of synthesizing the PdAg nanochain catalyst, we prepared PdAg catalysts with different materials. In this study, we have prepared the PdAg catalysts using DMF as a reducing agent and Pd^{2+} and Ag^{+} to obtain the PdAg catalyst. NaBr was added in the experiment to control the morphology of the nanoparticles. For comparison, the PdAg catalyst without the addition of NaBr was also prepared. SEM images are displayed in Figure S2.

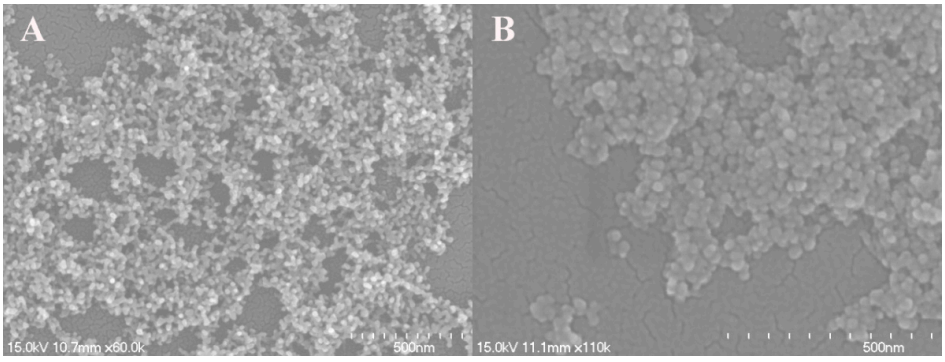

Figure S2. SEM image of PdAg catalyst prepared with NaBr (**A**), without NaBr (**B**).

In this paper, we have characterized the Brunauer-Emmett-Teller (BET) surface area of the final product PdAg catalyst. The corresponding BET specific surface area is about 33.6 m^2 $g^{-}1$. The typical N_2 adsorption-desorption isotherm of the as-prepared PdAg catalyst is shown in Figure S3.

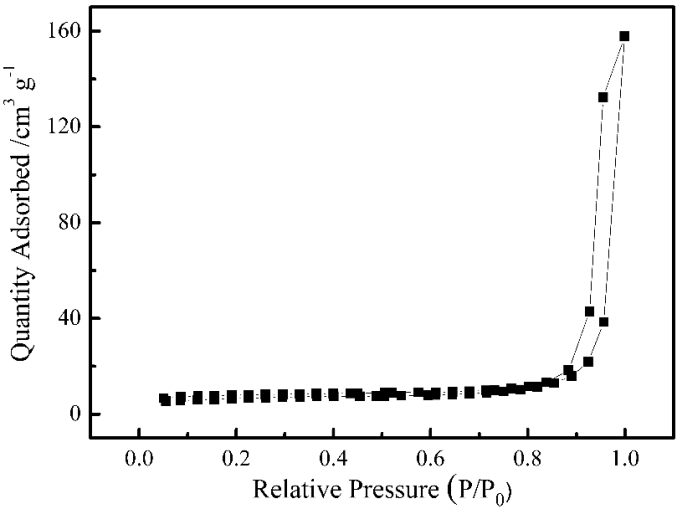

Figure S3. Typical N_2 adsorption-desorption isotherm of the as-prepared PdAg catalyst.