

Supplementary Material

Electrocatalysts synthesis

Table S1 shows the amount of each reagent used in the synthesis of the catalysts and their respective yields.

Table S1 Amount of the reagents used for the synthesis of each electrocatalysts

	Pd₈₀Ag₂₀/C	Pd₆₀Ag₄₀/C	Pd/C	Ag/C
Pd(NO₃)₂ (g)	0.0798	0.0748	0.0965	-
AgNO₃ (g)	0.0127	0.0318	-	0.0628
Citric acid (g)	0.3144	0.3918	0.3152	0.3121
Ethilenoglycol (mL)	0.2671	0.2512	0.2543	0.3248
Carbon vulcan (g)	0.0605	0.0603	0.0602	0.0599
Catalyst theoretical mass (g)	0.100	0.100	0.100	0.100
Experimental mass of catalysts after calcination (g)	0.0986	0.0965	0.0971	0.0979
Yield (%)	98.6	96.5	97.1	97.9

Due to the very small mass measurements, undesirable errors may occur in the measurements of the precursor materials. Table S1 presents the values of the mass measurements of each slapper used in this work, where it is possible to observe that the amount of the Pd precursor salt (Pd(NO₃)₂) are very close for the PdAg/C catalysts. The Ag precursor salt (AgNO₃) showed a higher value than expected for Pd₆₀Ag₄₀/C (Table S1). Since the values are calculated by Equation 12, accurate measurements should be sought for the calculated values, which was probably not possible in the measurements reported in this work. Since the values follow stoichiometric ratios, one can observe that the values of AgNO₃ in the Pd₆₀Ag₄₀/C catalyst, increasing the metal mass and decreasing the carbon mass observed in EDX and TG. Unfortunately it was not possible to avoid this experimental error that is only observed after the synthesis of the catalyst and its analysis by EDX and TG techniques.

EDX-SEM

Table S2 shows the values obtained by EDX. The values were calculated without considering the composition in relation to aluminum, carbon and oxygen and Figure S1 shows the SEM images.

Table S2. Atomic compositions of electrocatalysts obtained by EDX.

<i>(% mol) Theor. Composition</i>	<i>(% mol) Exp. Composition</i>	% atomic	
		Pd	Ag
Pd/C	Pd/C	4.74	-
Ag/C	Ag/C	-	6.65
Pd ₈₀ Ag ₂₀ /C	Pd ₇₉ Ag ₂₁ /C	5.81	1.54
Pd ₆₀ Ag ₄₀ /C	Pd ₅₈ Ag ₄₂ /C	3.10	2.29

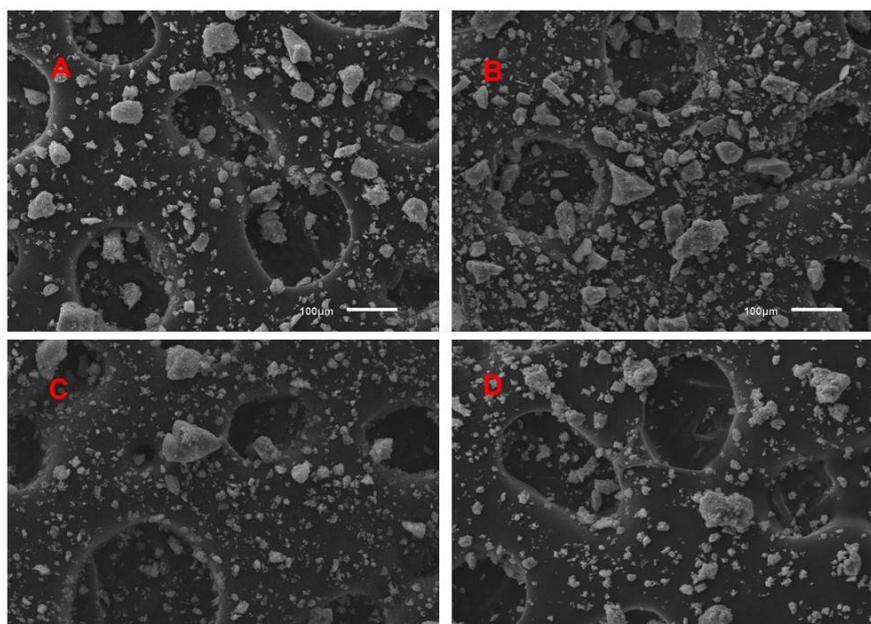


Figure S1. SEM micrographs of electrocatalysts (A) Pd/C (B) Ag/C (C) Pd₈₀Ag₂₀/C (D) Pd₆₀Ag₄₀/C.

Cyclic voltammetry in KOH-Ethanol (mA mgPd^{-1})

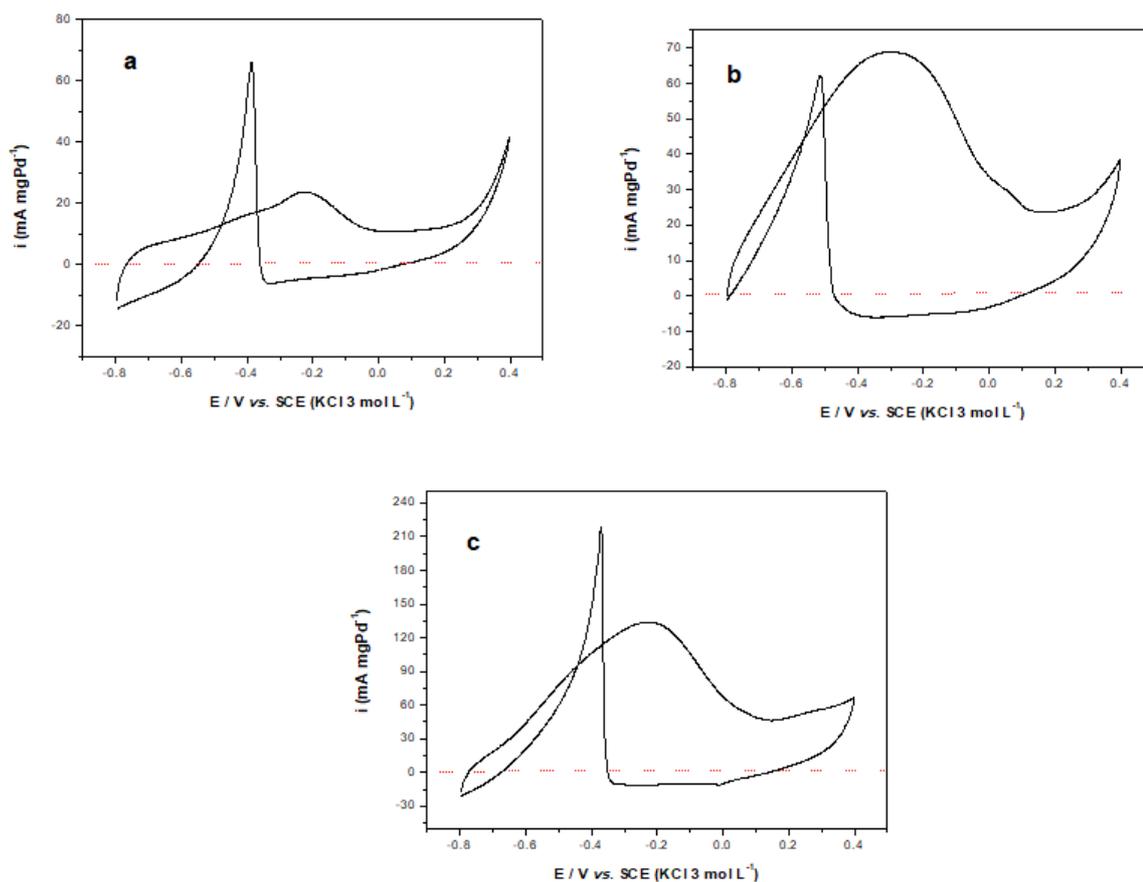


Figure S2. Cyclic voltammograms of the electrocatalysts (mA mgPd^{-1})

40% Pd-based/C in N_2 -purged KOH 1.0 mol L^{-1} /ethanol at scan rate of 20 mV s^{-1} (a) Pd/C (b) Pd₈₀Ag₂₀/C (c) Pd₆₀Ag₄₀/C

Chronoamperometry (mA mgPd⁻¹)

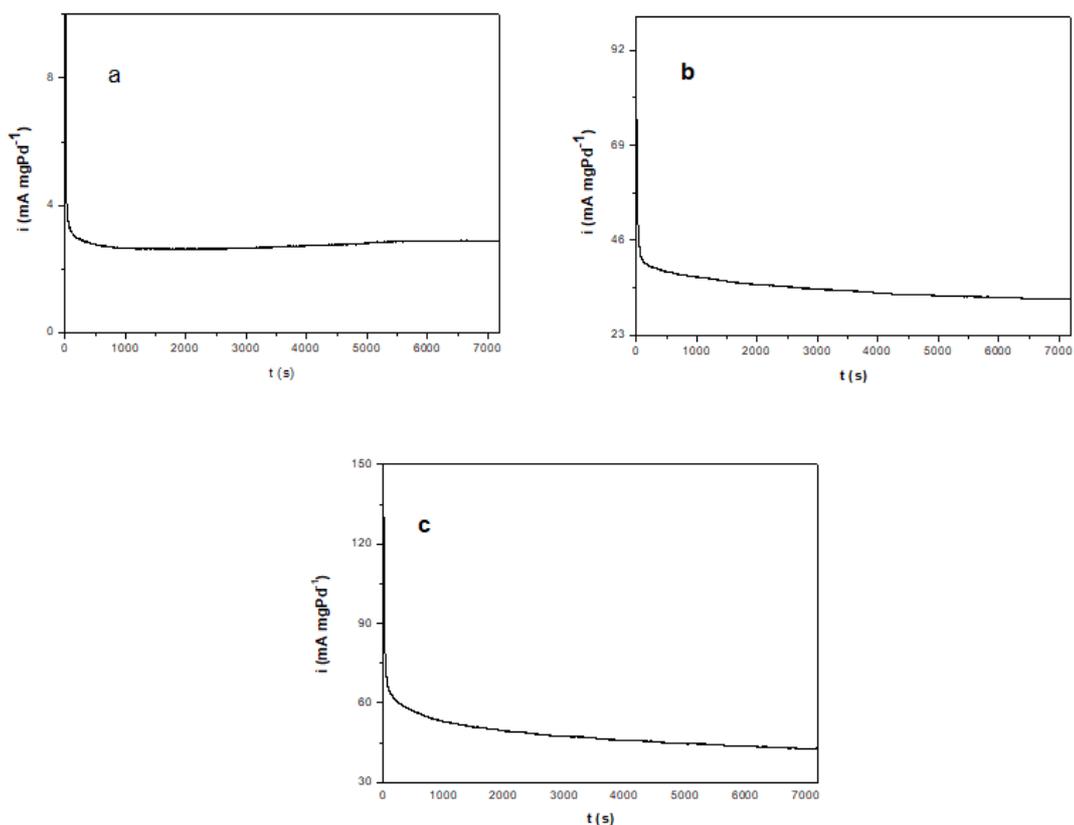


Figure S3 Chronoamperometry curves of the electrocatalysts (mA mgPd⁻¹) 40% Pd-based/C in N₂-purged KOH 1.0 mol L⁻¹/ethanol electrolyte at -0.4 V vs. SCE (a) Pd/C (b) Pd₈₀Ag₂₀/C (c) Pd₆₀Ag₄₀/C