Supporting Information

In Situ Growth of Pt-Co Nanocrystals on Different Types of Carbon Supports and Their Electrochemical Performance toward Oxygen Reduction

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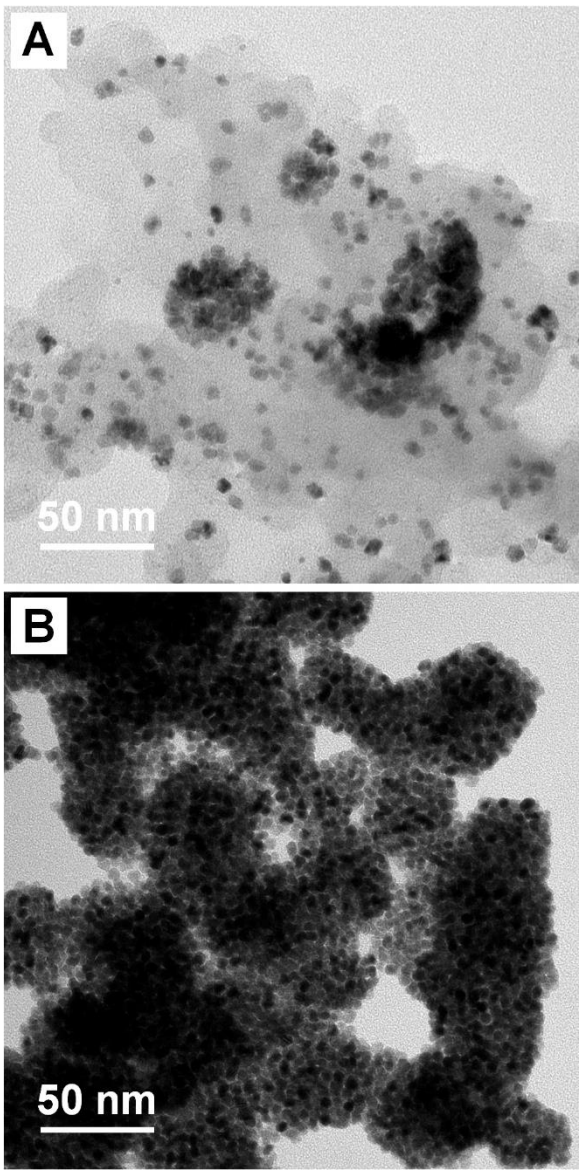

Figure S1. TEM images of the Vulcan XC72-supported Pt-Co nanocrystals prepared using the standard protocol except for (A) the absence of benzoic acid and (B) the absence of carbon support, respectively.

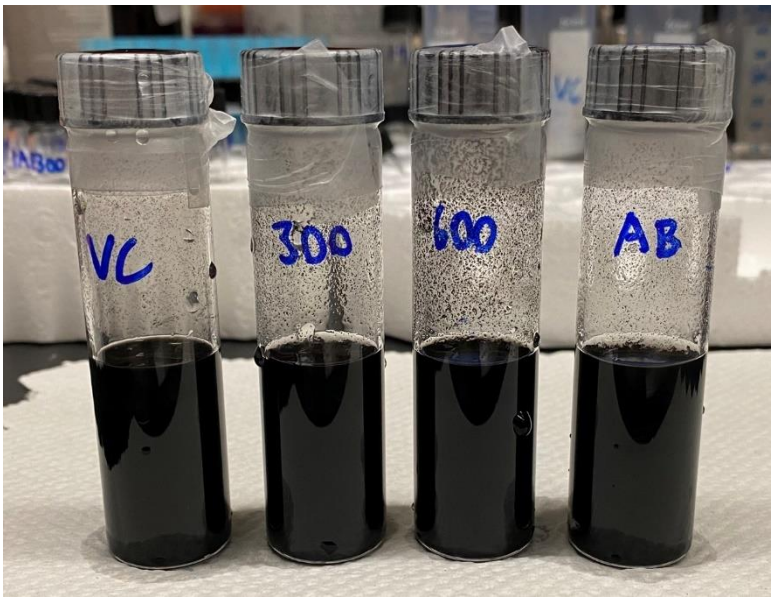

Figure S2. Photograph showing the typical dispersions of Vulcan XC72, Ketjenblack EC300J, Ketjenblack EC600J, and acetylene black, respectively, in DMF (1.8 mg/mL) from left to right.

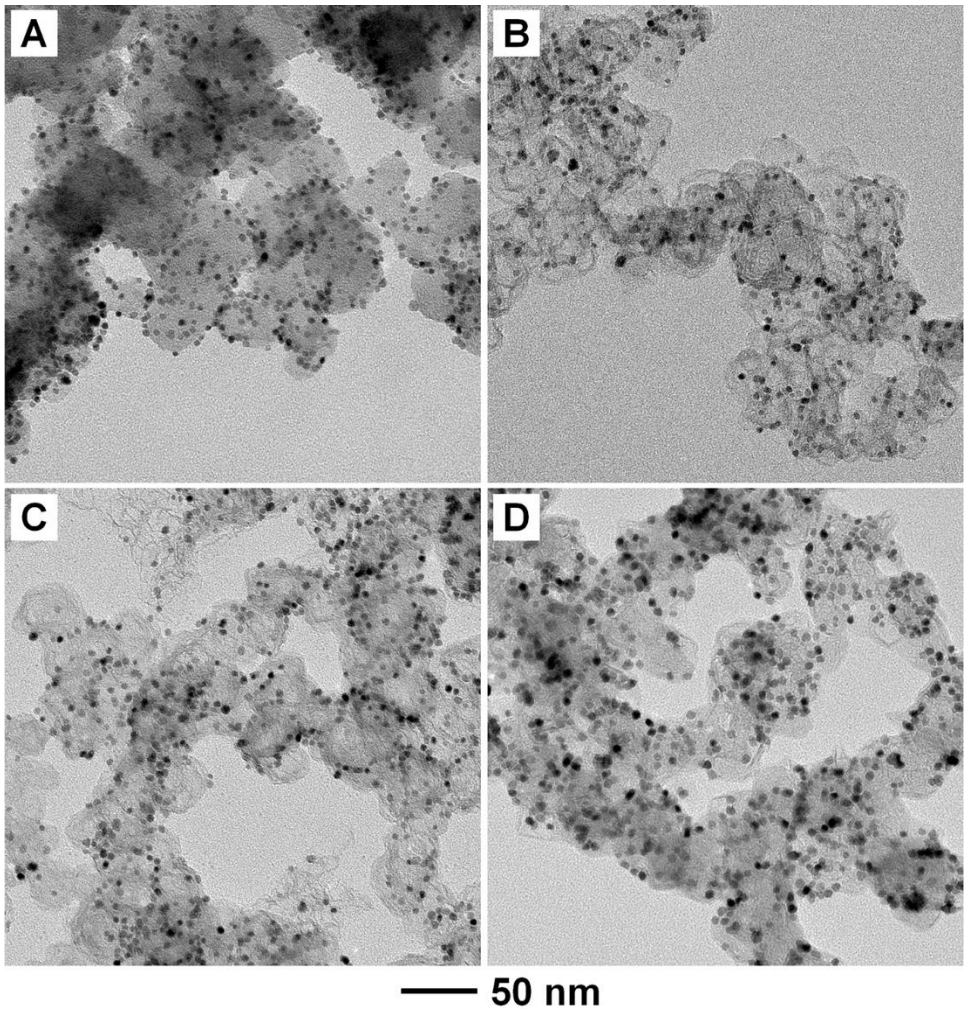

Figure S3. TEM images of the Pt-Co nanocrystals grown on (A) Vulcan XC72, (B) Ketjenblack EC300J, (C) Ketjenblack EC600J, and (D) acetylene black, respectively. They are also shown in Figure 2 at a higher magnification.

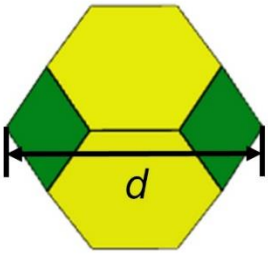

Figure S4. Definition of the size (*d*) of a truncated octahedron.

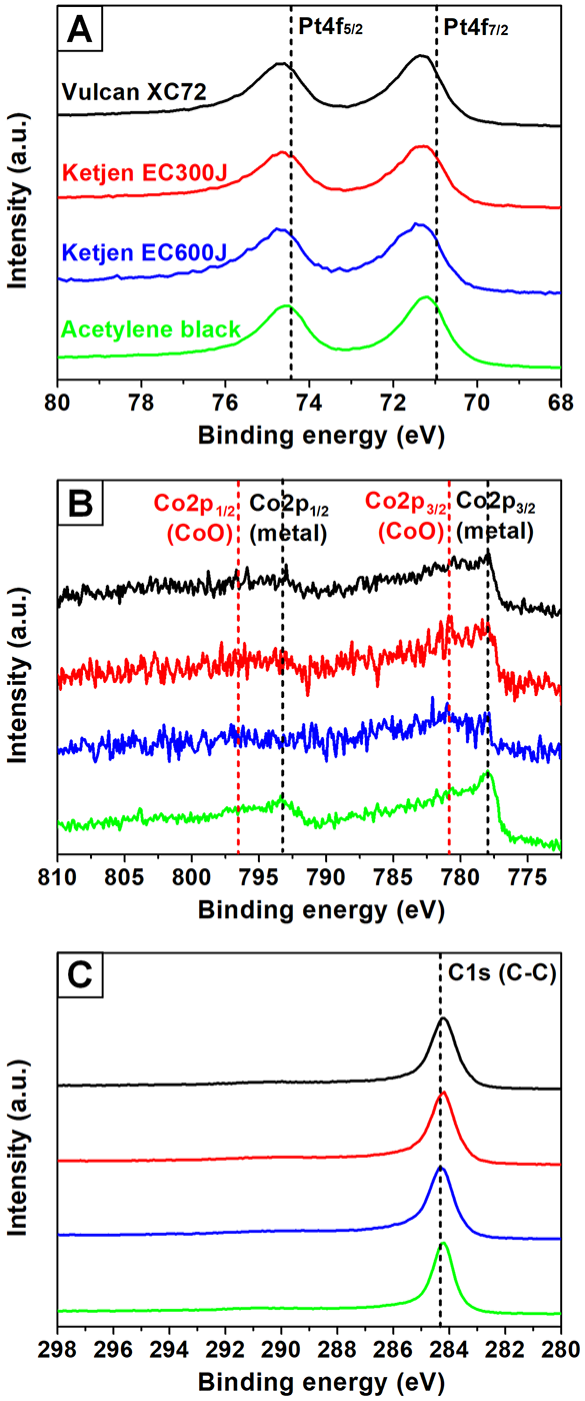

Figure S5. XPS spectra of the carbon-supported Pt-Co nanocrystals: (A) Pt 4f, (B) Co 2p, and (C) C 1s.

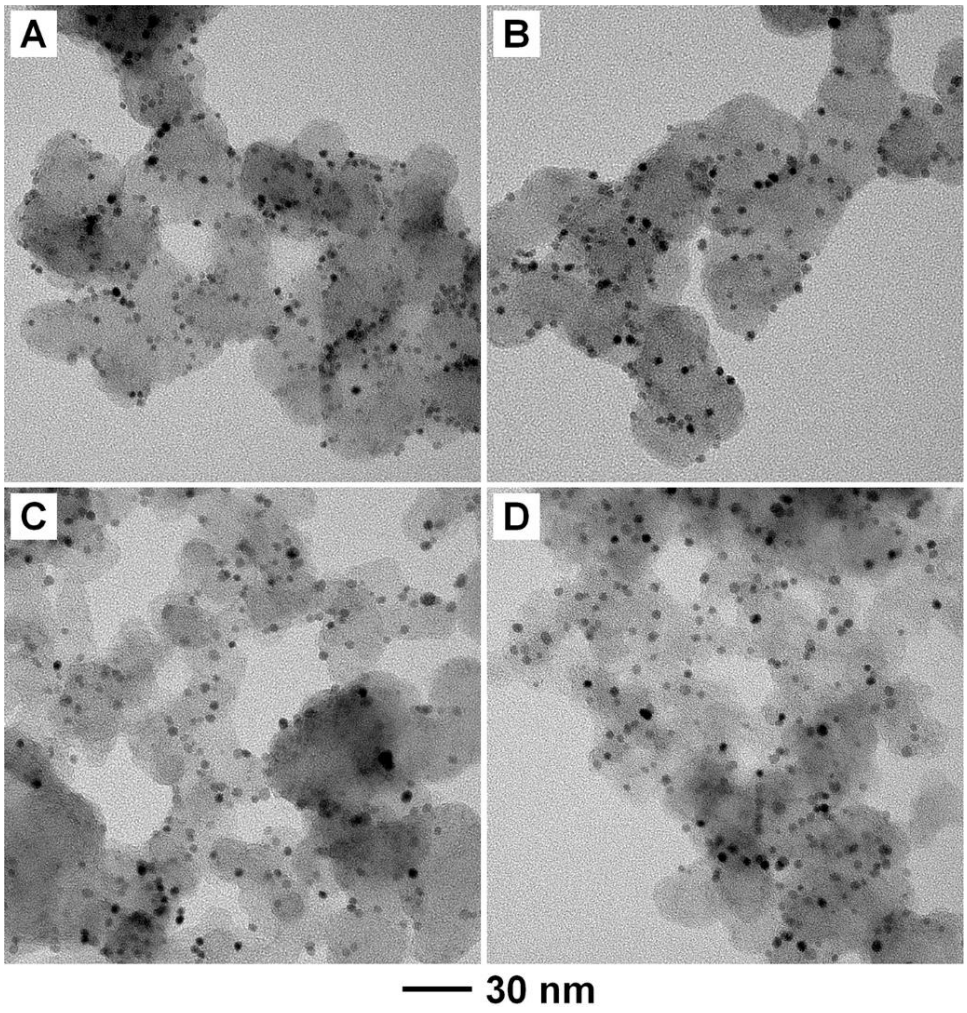

Figure S6. TEM images of the Vulcan XC72-supported Pt-Co nanocrystals prepared using the standard protocol except for the variation in reaction time: (A) 2, (B) 4, (C) 6, and (D) 8 h.

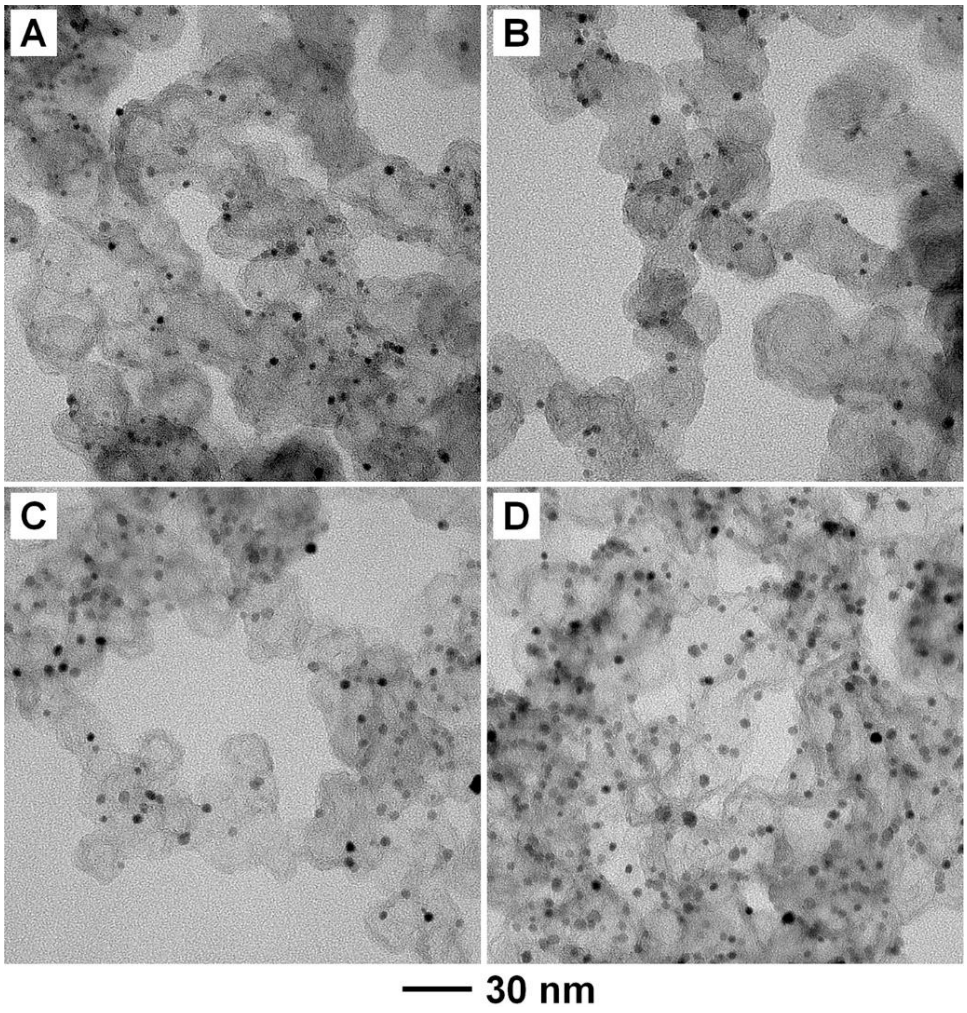

Figure S7. TEM images of the Ketjenblack EC300J-supported Pt-Co nanocrystals prepared using the standard protocol except for the variation in reaction time: (A) 2, (B) 4, (C) 6, and (D) 8 h.

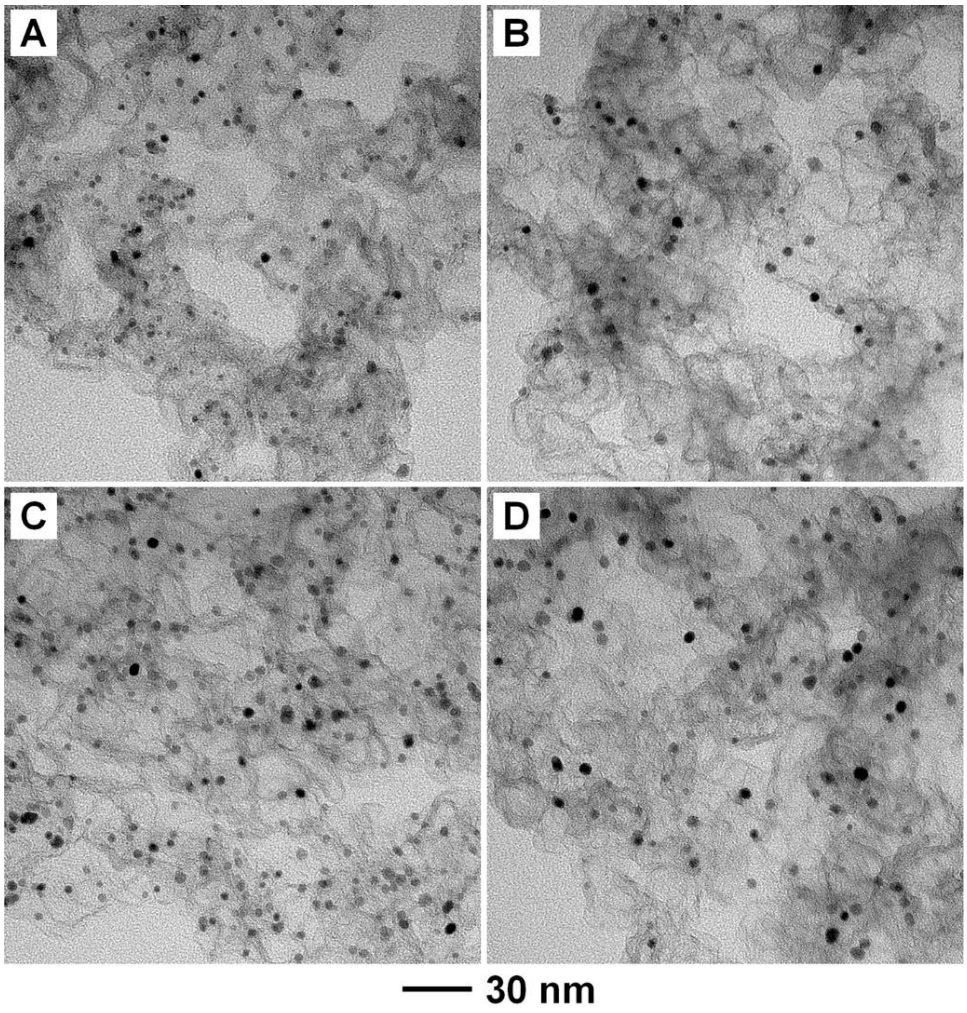

Figure S8. TEM images of the Ketjenblack EC600J-supported Pt-Co nanocrystals prepared using the standard protocol except for the variation in reaction time: (A) 2, (B) 4, (C) 6, and (D) 8 h.

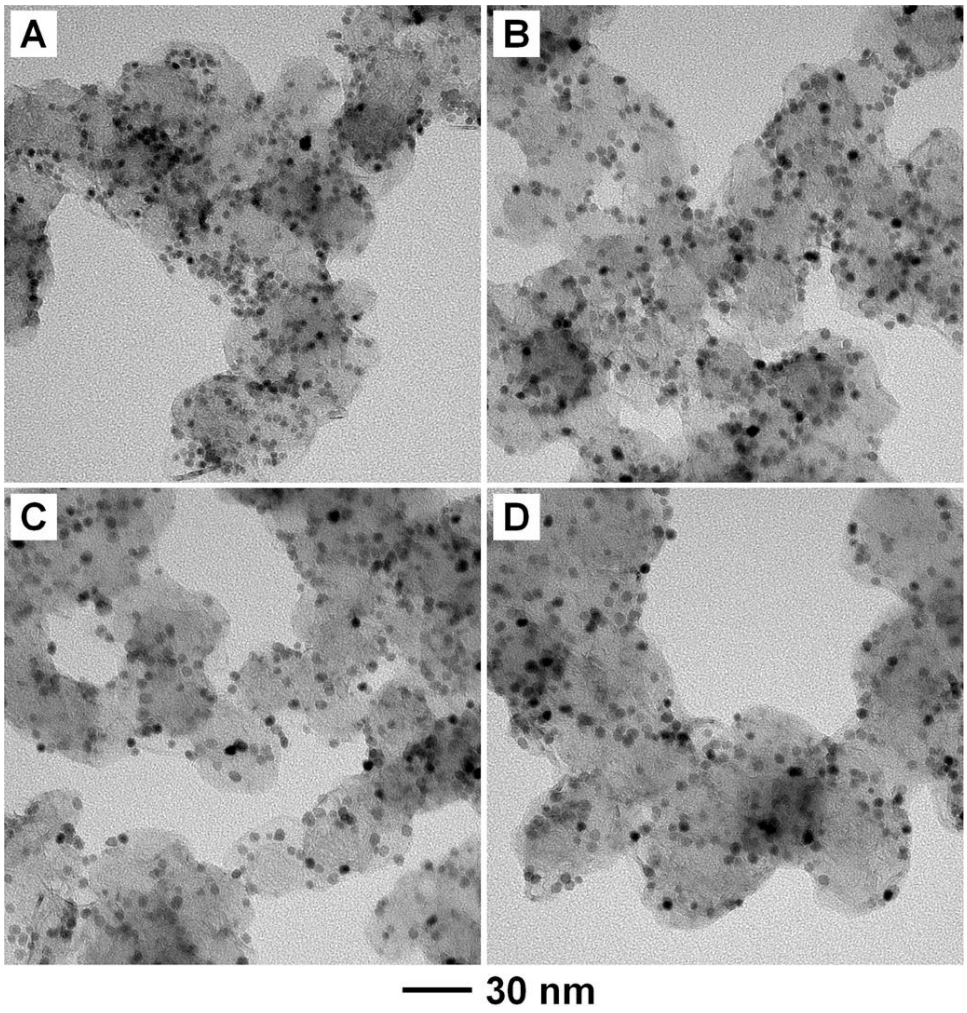

Figure S9. TEM images of the acetylene black-supported Pt-Co nanocrystals prepared using the standard protocol except for the variation in reaction time: (A) 2, (B) 4, (C) 6, and (D) 8 h.

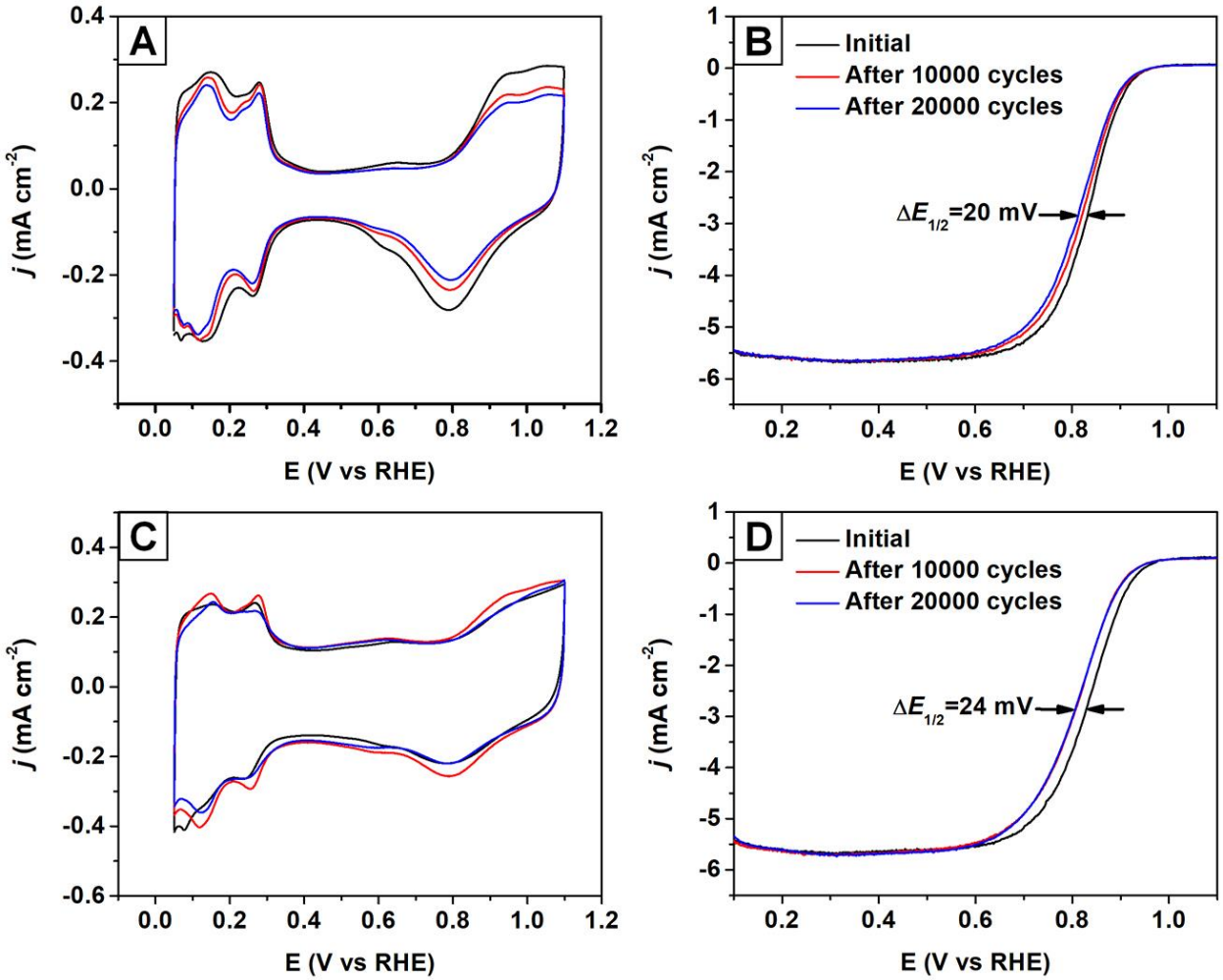

Figure S10. (A) CV and (B) ORR polarization curves recorded from the Pt-Co nanocrystals supported on Vulcan XC72 before and after different cycles of ADT. (C) CV and (D) ORR polarization curves recorded from the Pt-Co nanocrystals supported on Ketjenblack EC300J before and after different cycles of ADT. The currents were normalized to the geometric area of the rotating disk electrode.

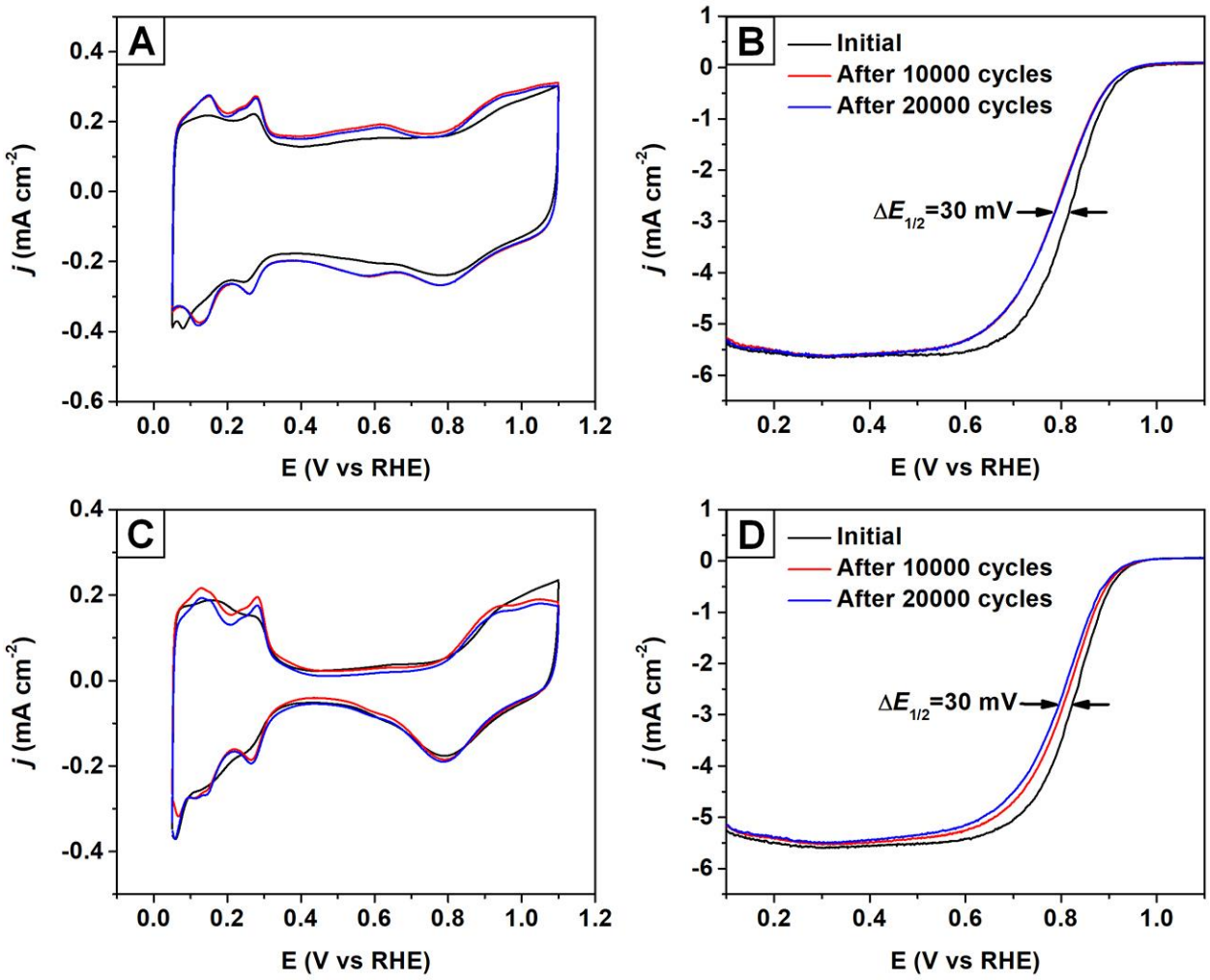

Figure S11. (A) CV and (B) ORR polarization curves recorded from the Pt-Co nanocrystals supported on Ketjenblack EC600J before and after different cycles of ADT. (C) CV and (D) ORR polarization curves recorded from the Pt-Co nanocrystals supported on acetylene black before and after different cycles of ADT. The currents were normalized to the geometric area of the rotating disk electrode.

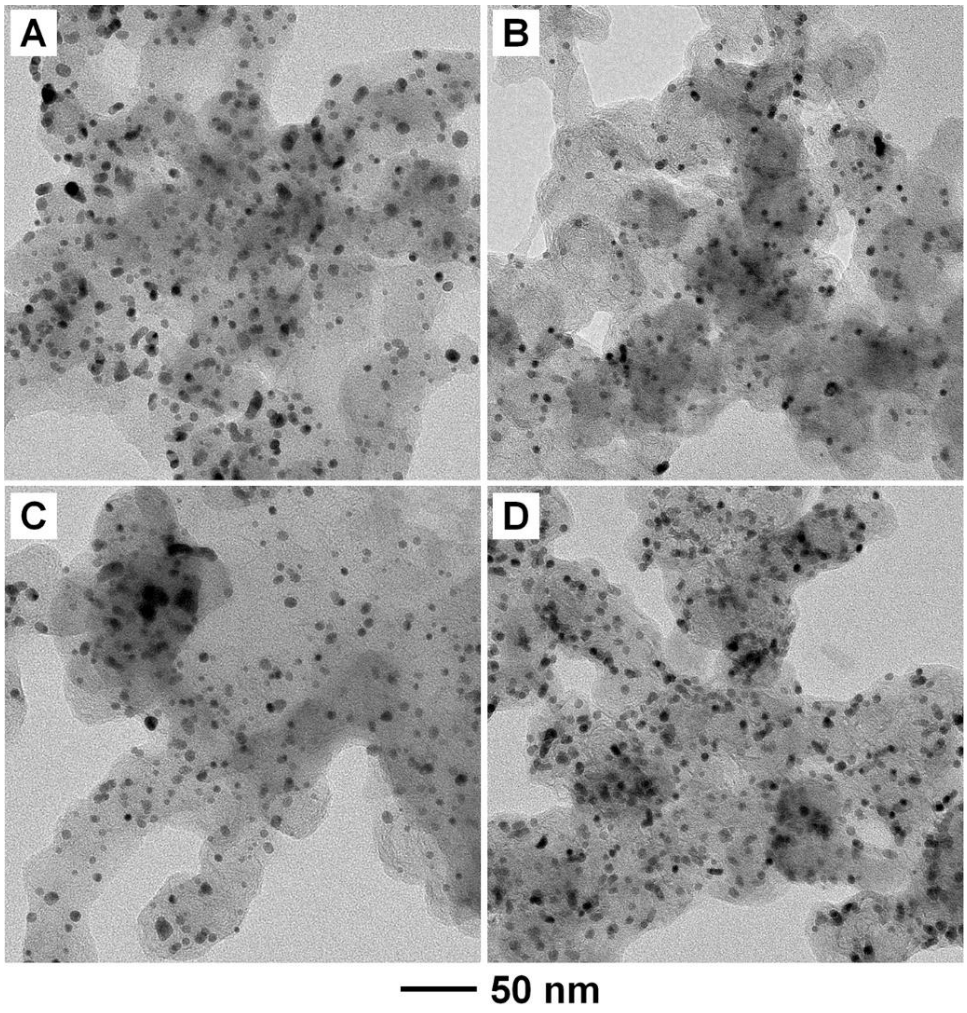

Figure S12. TEM images of the Pt-Co nanocrystals grown on (A) Vulcan XC72, (B) Ketjenblack EC300J, (C) Ketjenblack EC600J, and (D) acetylene black, respectively, after 20,000 cycles of ADT in 0.05 M H_2SO_4. They are shown in Figure 8 at a relatively higher magnification.

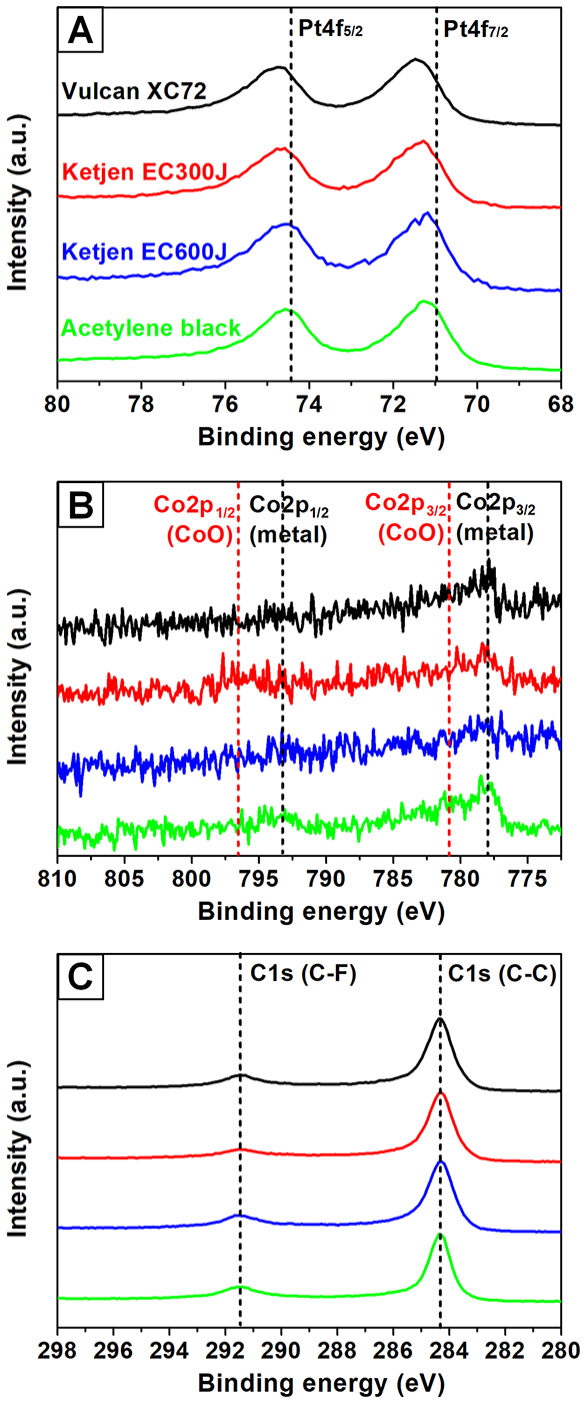

Figure S13. XPS spectra of the carbon-supported Pt-Co nanocrystals after the durability test: (A) Pt 4f, (B) Co 2p, and (C) C 1s.

Table S1. Comparison of the different types of carbon supports.

Sample	Supplier	Type of carbon	Pore diameter (nm)	DBP adsorption (mL 100 g^{-1})[a]	BET surface area (m^2 g^{-1})[b]
Vulcan XC72	Cabot Corp.	Furnace black	2.0	190	250
Ketjenblack EC300J	Ketjen Black International	Furnace black	4.9	360	800
Ketjenblack EC600J	Ketjen Black International	Furnace black	6.7	495	1270
Acetylene black	Strem Chemicals Inc.	Acetylene black	42.0	/	60-80

[a]DBP: dibutyl phthalate number (measure of carbon void volume)

[b]BET: Brunauer-Emmett-Teller method

Table S2. Electrochemically active surface area (ECSA), specific activity (SA), and mass activity (MA) of Pt-Co nanocrystals supported on different types of carbon supports before and after different cycles of ADT in 0.05 M H_2SO_4.

Sample	Cycles of ADT	ECSA ($m^2 g_{Pt}^{-1}$)	SA at 0.9 V_{RHE} ($mA\ cm^{-2}$)	MA at 0.9 V_{RHE} ($A\ mg_{Pt}^{-1}$)
Vulcan XC72	Initial	56.7	0.14	0.079
	10000	51.3	0.12	0.059
	20000	46.9	0.11	0.050
Ketjenblack	Initial	43.8	0.26	0.114
EC300J	10000	44.7	0.13	0.060
	20000	38.8	0.16	0.062
Ketjenblack	Initial	45.7	0.25	0.114
EC600J	10000	46.7	0.15	0.070
	20000	46.3	0.16	0.074
Acetylene	Initial	44.3	0.15	0.068
black	10000	46.2	0.11	0.049
	20000	44.7	0.09	0.042