

Supporting information:

Structural disordering of de-alloyed Pt bimetallic nanocatalysts: The effect on oxygen reduction reaction activity and stability.

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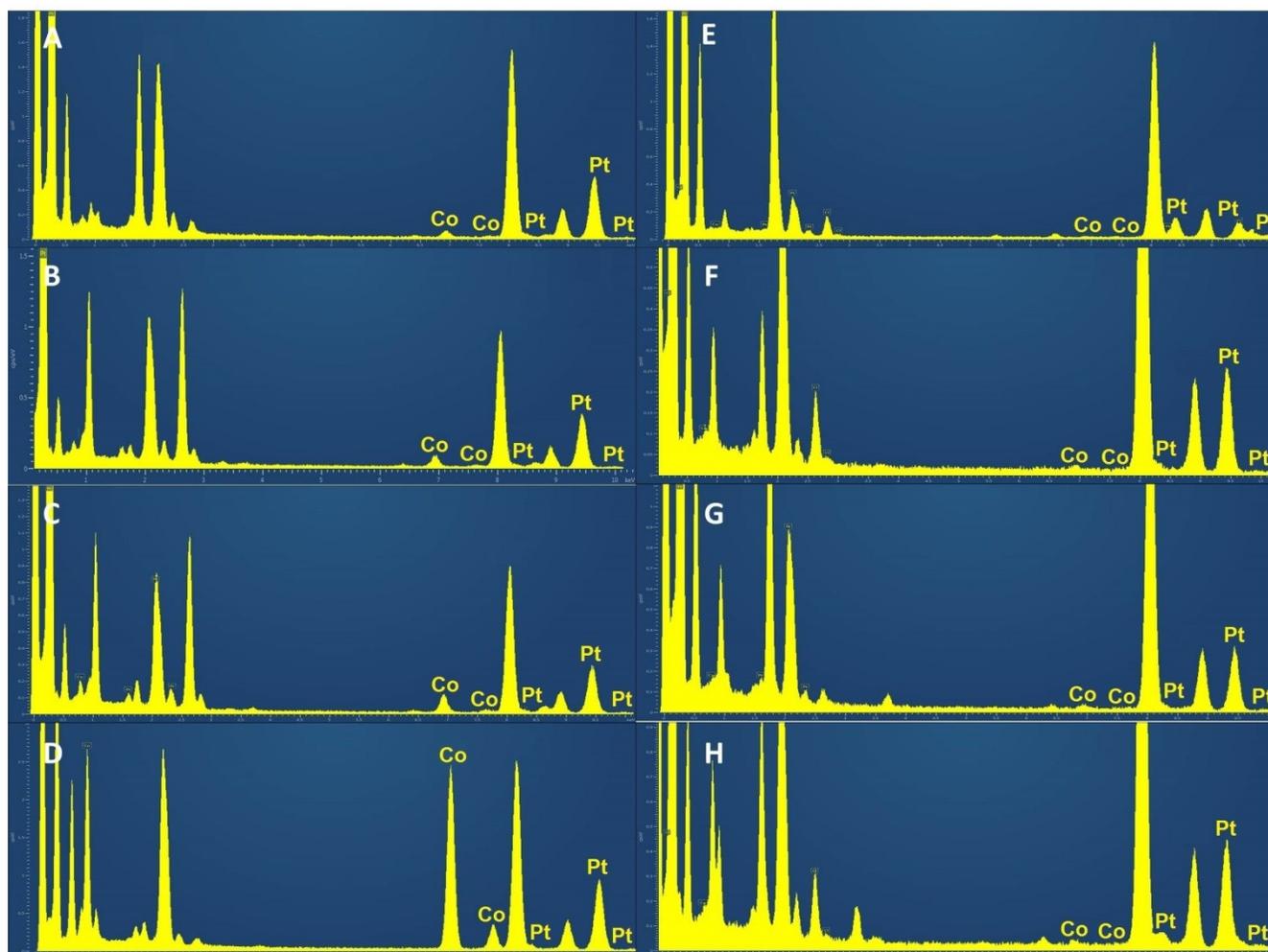


Figure S1. EDS spectra of $\text{Pt}_x\text{Co}_{1-x}$ nanoalloys: A-D) Treated with isopropanol to avoid Co leaching. The initial cobalt content of the nanoparticles is close to the theoretical one. E-H) After pre-leaching almost all cobalt is removed from the nanoparticles. Only the main (α) lines of Pt and Co are indicated.

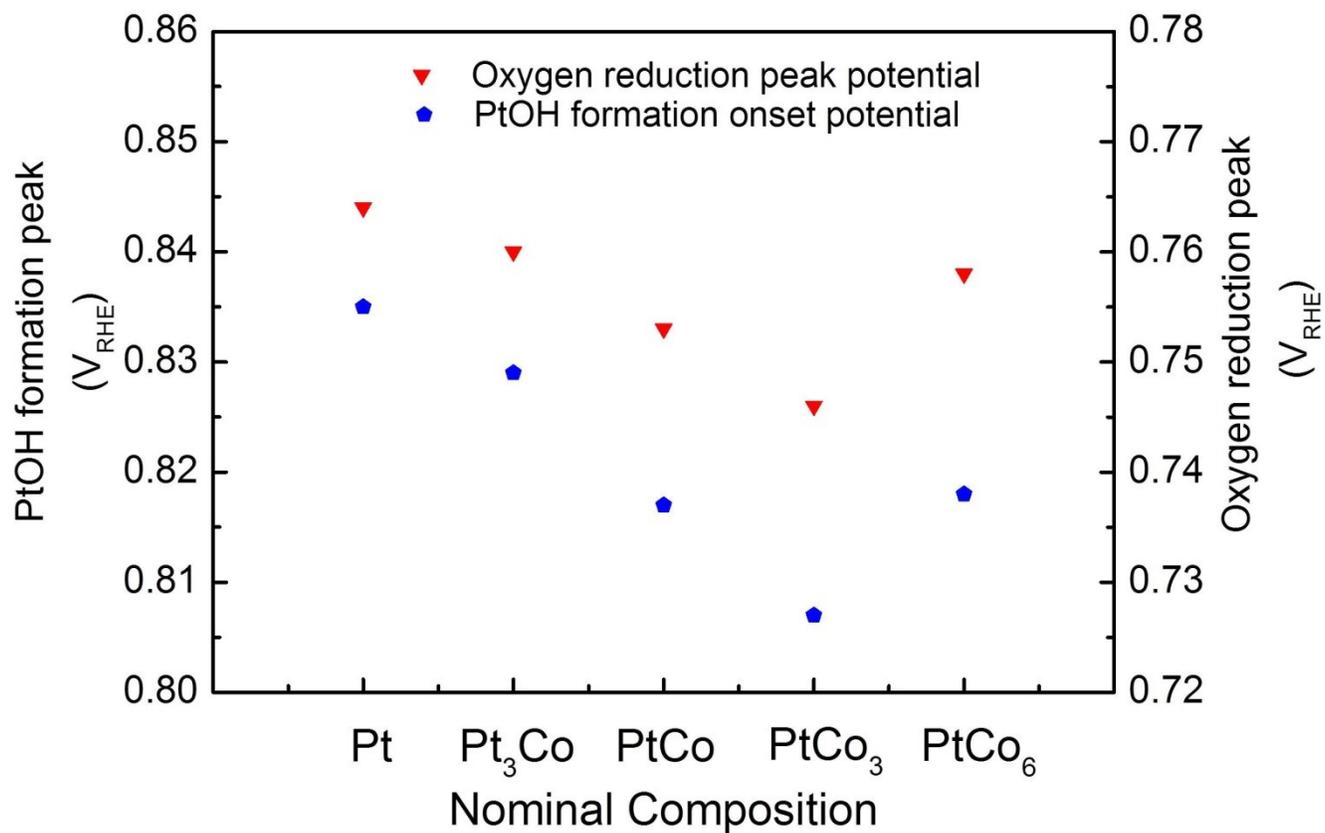


Figure S2. PtOH and oxygen reduction peak potentials of Pt_xCo_{1-x} nanocatalysts recorded in an Ar saturated 0.1M HClO₄ solution at 1600rpm and 50mV/s scan rate.

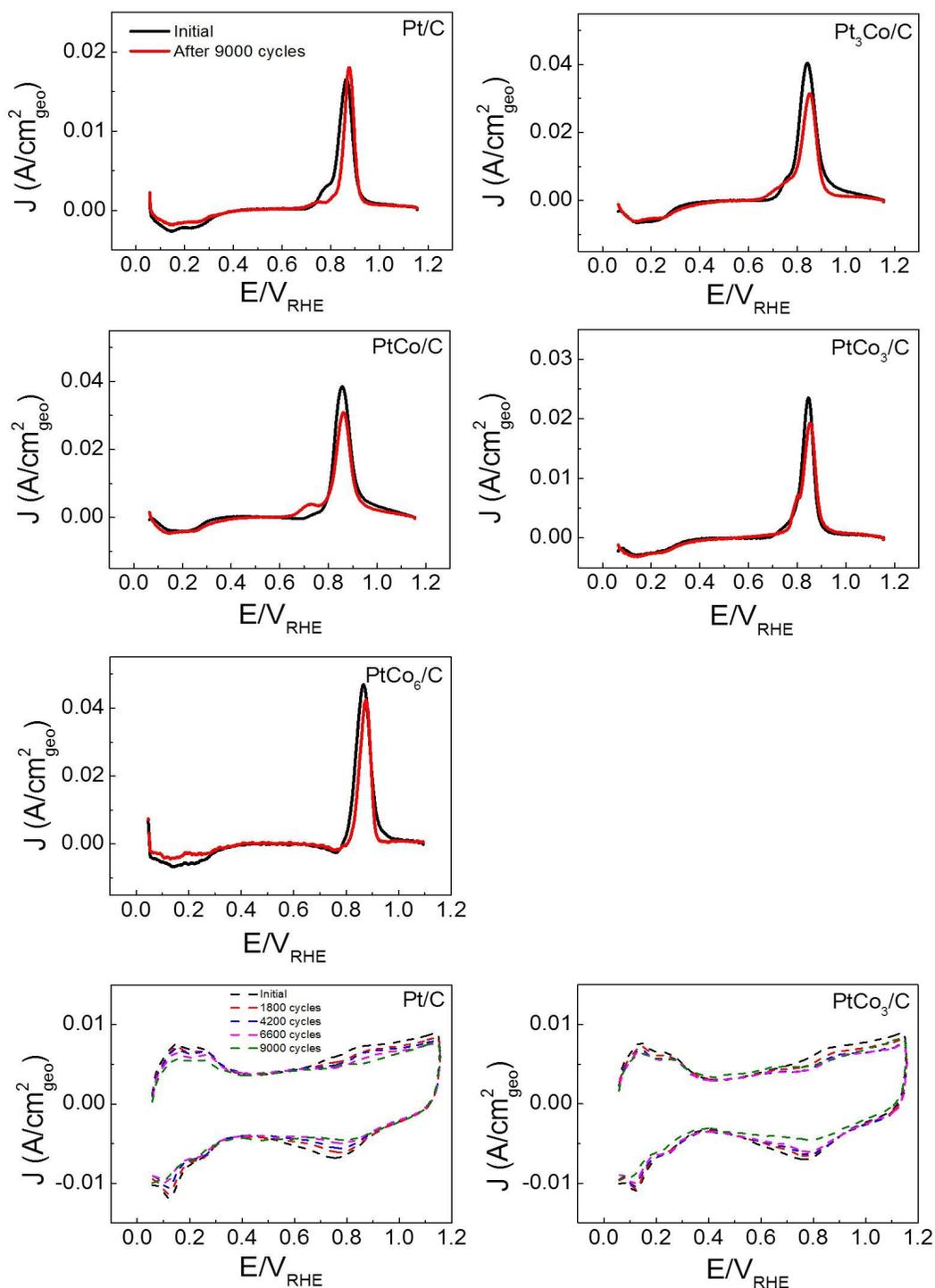


Figure S3. CO-stripping plots and cyclic voltamograms before and after the ASTs for the different Pt-alloys. CO desorption and Pt oxide formation potential shifts to higher potential indicate particle agglomeration.

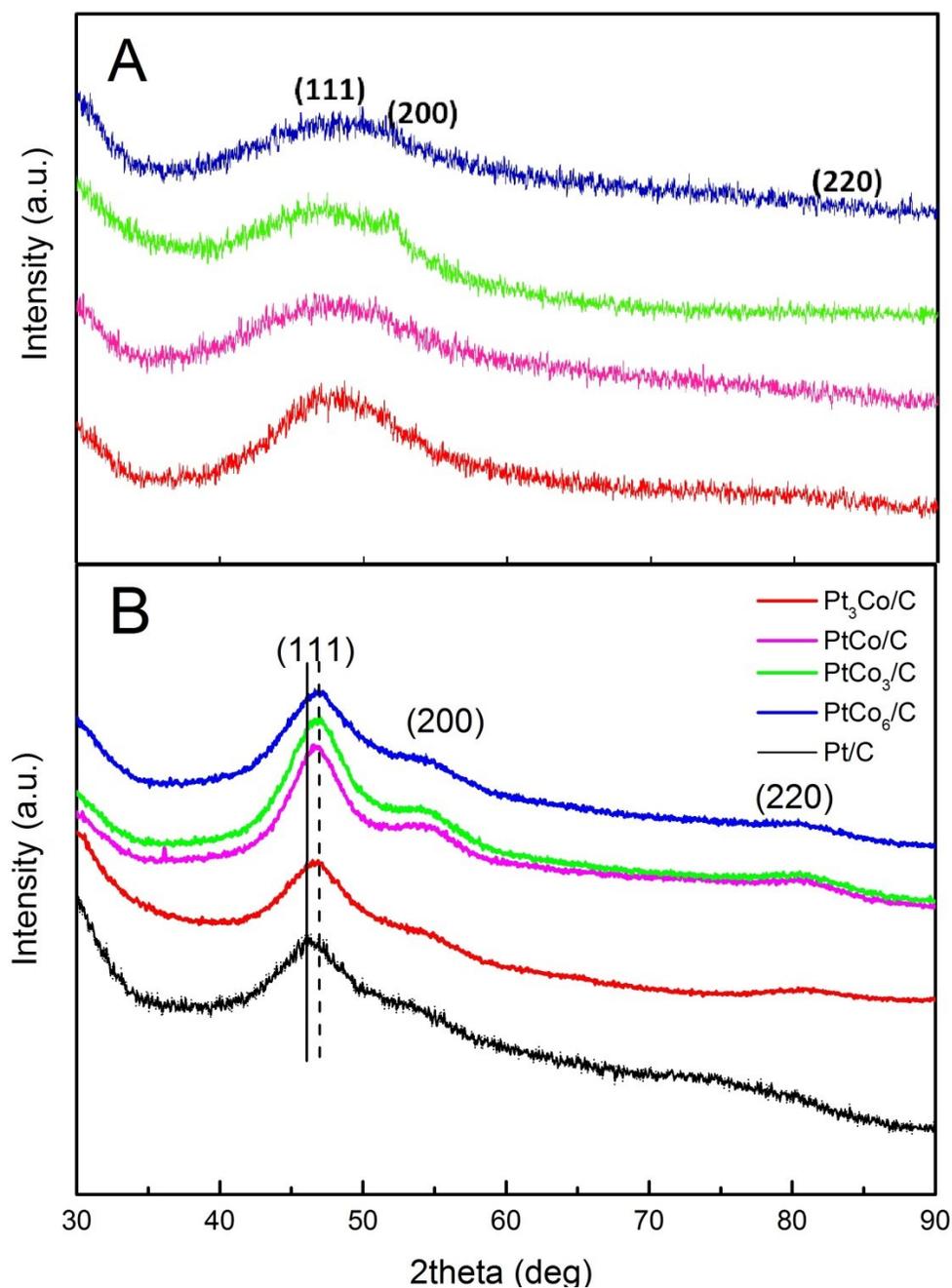


Figure S4. XRD spectra of $\text{Pt}_x\text{Co}_{1-x}/\text{C}$ catalysts A) before and B) after de-alloying (acid washing). The solid line indicates the (111) peak for pure Pt/C, the dashed line the (111) peak of PtCo_3 . Before acid washing the (111) diffraction peaks are broad and relatively undefined. Nevertheless a shift of the (111) peak to higher angles is observed. After acid washing the shift is smaller, but the diffraction peaks are

much better defined. The shift of the diffraction pattern for the acid leached Pt-alloys towards higher angles with increasing initial Co content indicates increasing strain.

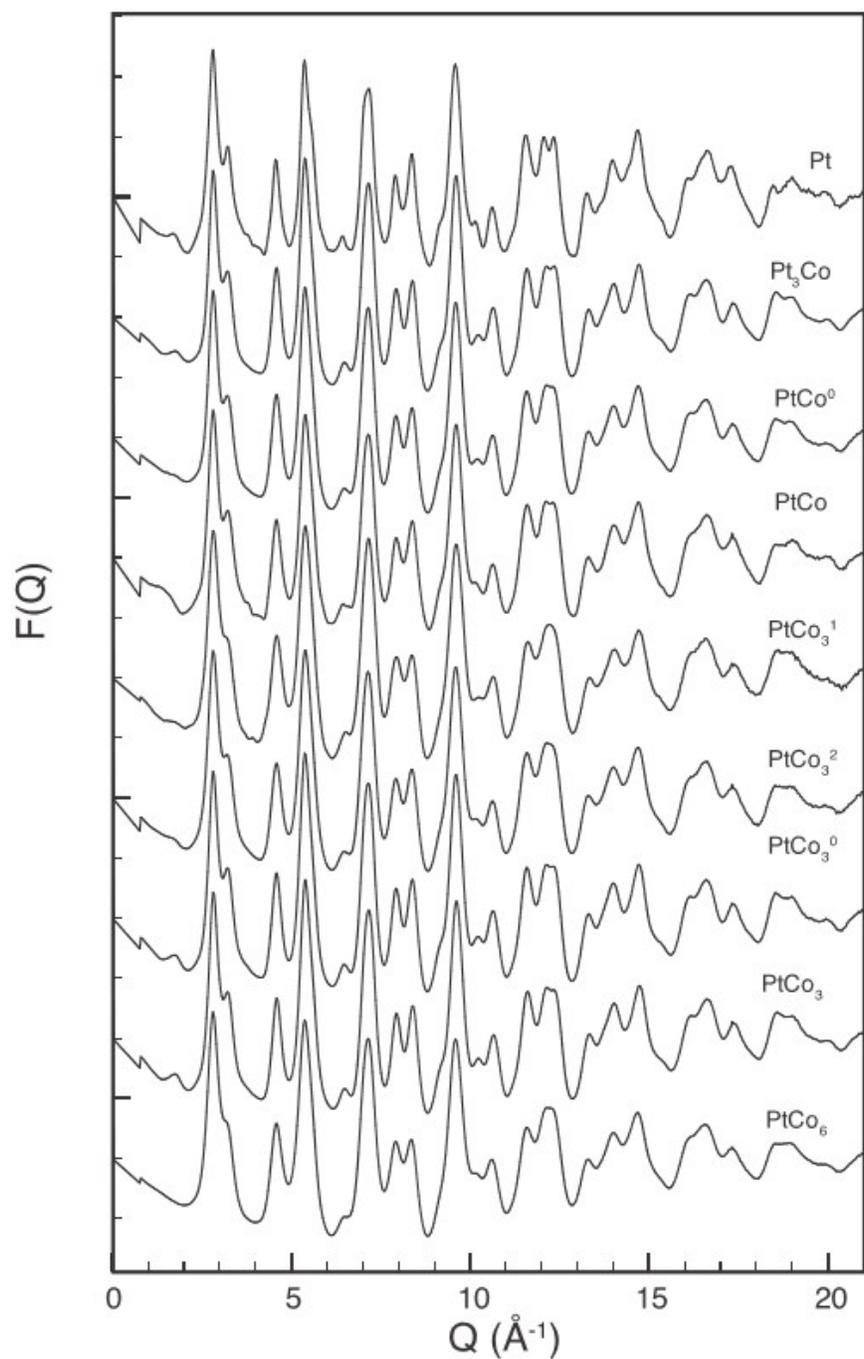


Figure S5. The reduced structure function, $F(Q)$, for pure Pt and the Pt-Co catalysts. PtCo^0 and PtCo_3^0 are synthesized without the addition of CTAB. PtCo_3^1 and PtCo_3^2 are synthesized with the addition of 1 and 2 times the total metal moles of CTAB.

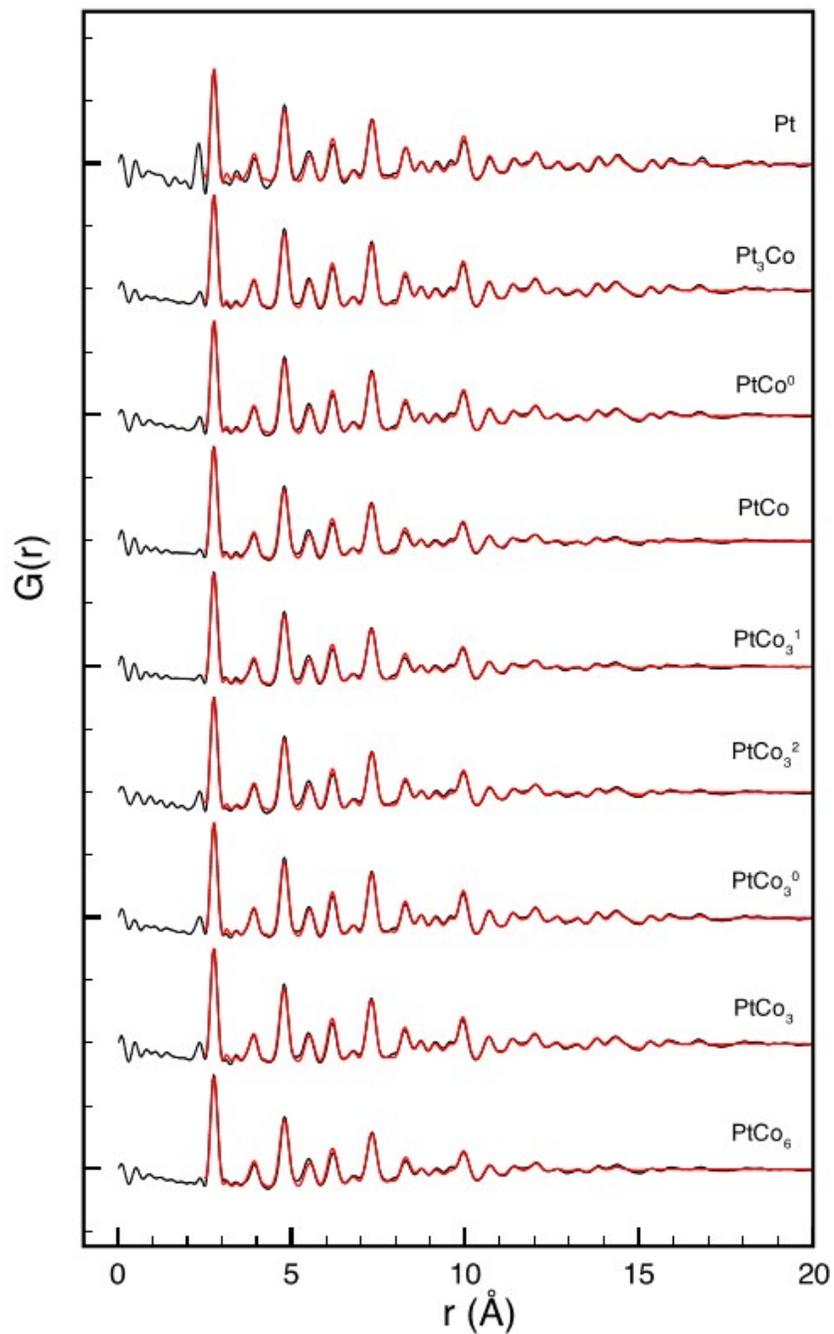


Figure S6. The measured PDF in the r-interval 0.01-20 Å as well as the PDFgui fit (red). PtCo⁰ and PtCo₃⁰ are synthesized without the addition of CTAB. PtCo₃¹ and PtCo₃² are synthesized with the addition of 1 and 2 times the total metal moles of CTAB.

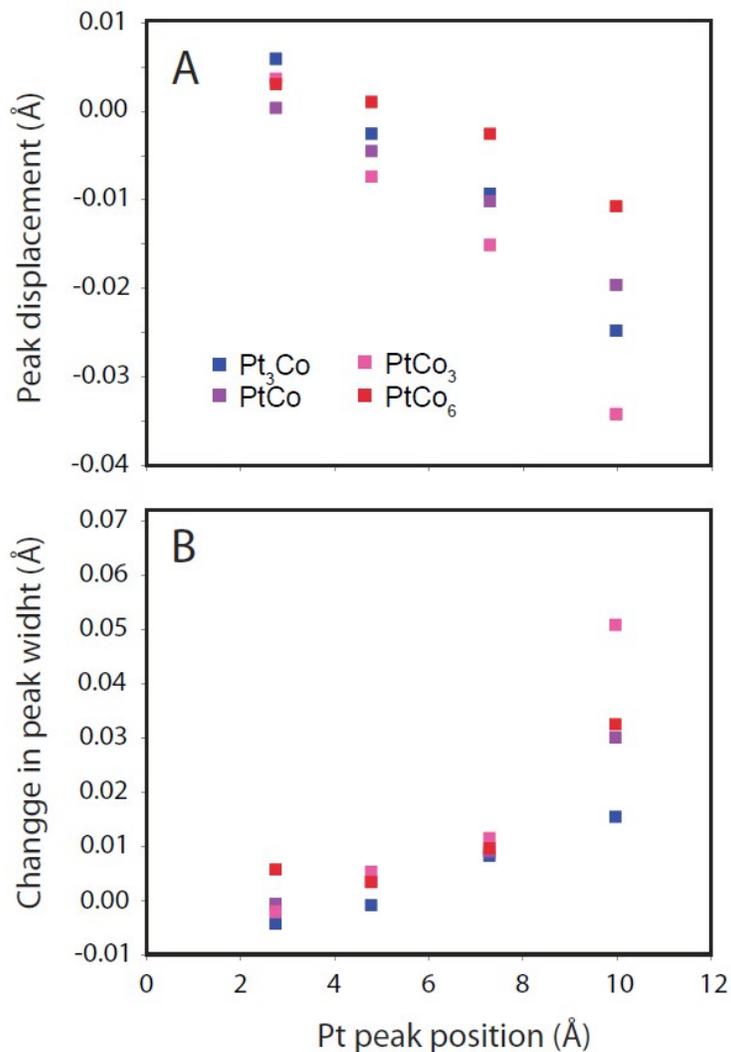


Figure S7. Results from fitting of peaks with Gaussian function. A) Displacement of peaks relative to the position determined for pure Pt and B) change in peak width relative to the width of the pure Pt. Both quantities are plotted as a function of the Pt peak position.

Sample	Co/(Pt+Co)	Size of coherent scattering domains (Å)	d_2	Lattice constant CTAB (HCl) XPD (Å)	Lattice constant CTAB (HCl) XRD (Å)	U_{iso} (Å ²)
<u>Pt</u>	0.00	21.9±1.9	5.2±0.6	3.902±0.004	3.93	0.0094±0.0013
<u>Pt₃Co</u>	0.25	21.1±0.8	4.7±0.3	3.897±0.002	3.90	0.0093±0.0006
<u>PtCo</u>	0.50	19.5±1.3	4.9±0.5	3.896±0.003	3.89	0.0099±0.0011
<u>PtCo^o</u>	0.50	20.0±0.9	4.8±0.3	3.900±0.002	-	0.0099±0.0007
<u>PtCo₃</u>	0.75	20.4±1.0	4.8±0.4	3.892±0.002	3.88	0.0099±0.0008
<u>PtCo₃²</u>	0.75	17.5±0.6	4.7±0.3	3.895±0.002	-	0.0105±0.0007
<u>PtCo₃¹</u>	0.75	20.4±1.0	4.7±0.4	3.898±0.002	-	0.0094±0.0007
<u>PtCo₃^o</u>	0.75	18.4±1.0	4.8±0.4	3.900±0.003	-	0.0104±0.0010
<u>PtCo₆</u>	0.86	17.3±0.7	4.8±0.3	3.903±0.002	3.89	0.0114±0.0008

Table S1. Structural properties of CTAB synthesized acid leached Pt_xCo_{1-x} nanocatalysts. PtCo^o and PtCo₃^o are synthesized without the addition of CTAB. PtCo₃¹ and PtCo₃² are synthesized with the addition of 1 and 2 times the total metal moles of CTAB.