

## Supporting Information

### **Effect of Pretreatment on Durability of fct-Structured Pt-Based Alloy Catalyst for the Oxygen Reduction Reaction under Operating Conditions in Polymer Electrolyte Membrane Fuel Cells**

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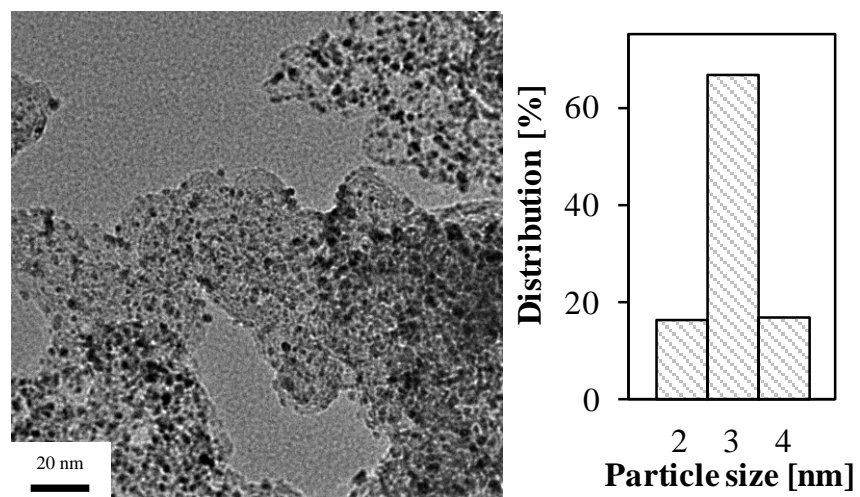


Figure S1. HR-TEM image and corresponding histogram of commercial Pt/C catalyst.

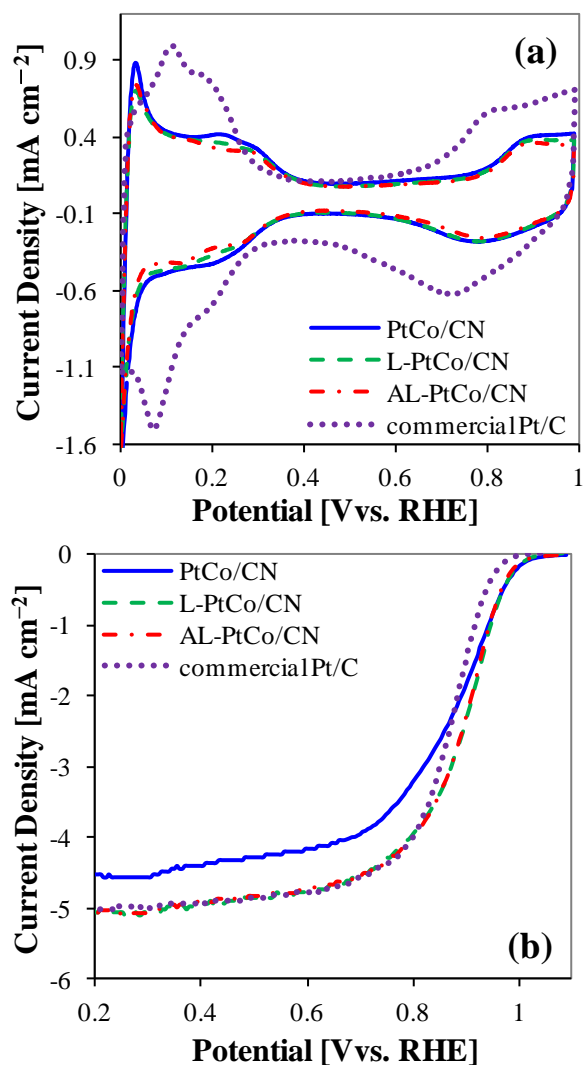


Figure S2. (a) CV diagrams and (b) LSV curves of PtCo/CN, L-PtCo/CN, AL-PtCo/CN and commercial Pt/C catalysts. The CV measurements were carried out at room temperature by sweeping the potential between 0.005 and 1.0 V (vs RHE) at  $50 \text{ mV s}^{-1}$  in  $\text{N}_2$ -saturated 0.1 M  $\text{HClO}_4$ . The LSV measurements were carried out between 0.2 and 1.05 V (vs RHE) at  $5 \text{ mV s}^{-1}$  with 1600 rpm at room temperature in  $\text{O}_2$ -saturated 0.1 M  $\text{HClO}_4$ . The catalyst loading was  $20 \mu\text{g}_{\text{Pt}} \text{ cm}^{-2}$ .

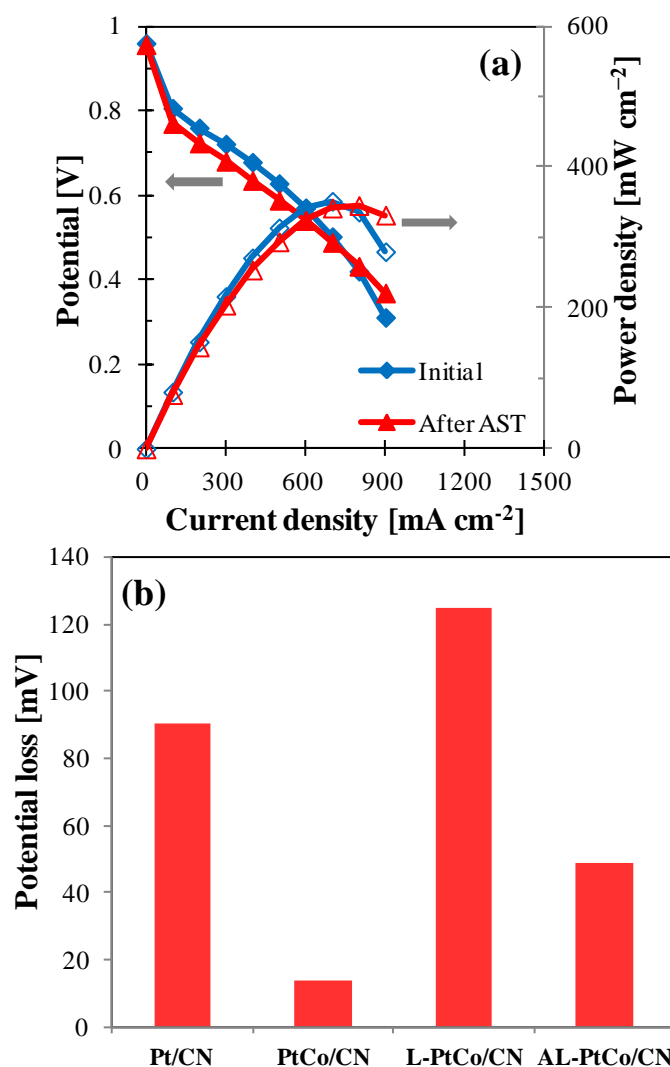


Figure S3. (a) PEMFC polarization and power density curves of the PtCo/CN catalyst before and after AST. (b) The potential losses of Pt/CN, PtCo/CN, L-PtCo/CN, and AL-PtCo/CN catalysts at at  $700 \text{ mA cm}^{-2}$  after AST. The Pt loading at the cathode is fixed at  $0.1 \text{ mg}_{\text{Pt}} \text{ cm}^{-2}$ .  $\text{H}_2$  and air were supplied to the anode and cathode at a stoichiometry of 1.5 and 1.8, respectively. AST was performed under 30000 potential cycles between 0.6 and 1.0 V, supplying fully humidified  $\text{H}_2/\text{N}_2$  to the anode and cathode at  $80^\circ\text{C}$ , respectively.

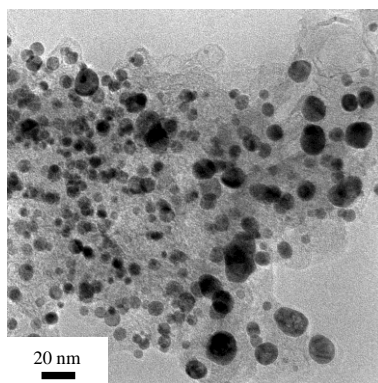


Figure S4. HR-TEM images of PtCo/CN catalyst after AST.

Table S1. Characteristics of the L-PtCo/CN and AL-PtCo/CN catalysts obtained from deconvoluted XPS Pt 4f peaks before and after AST.

	Initial		after AST	
	L-PtCo	AL-PtCo	L-PtCo	AL-PtCo
Pt(0)	59.4%	69.8%	35.5%	67.0%
Pt(II)	24.5%	22.8%	31.2%	23.7%
Pt(IV)	16.0%	7.4%	33.2%	9.4%
O 1s	2.6%	2.8%	16.7%	8.4%
C 1s	92.3%	92.9%	80.4%	88.7%

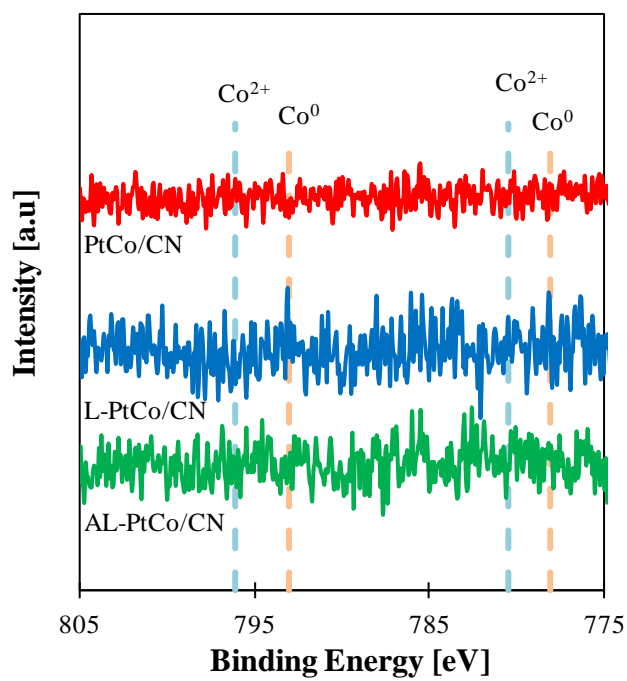


Figure S5. Comparison of XPS spectra of Co 2p of Pt/CN, PtCo/CN, L-PtCo/CN, and AL-PtCo/CN catalysts after AST.