

Effect of long-term short-circuiting in proton exchange membrane fuel cells

Electronic Supplementary Information

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S1. TEM

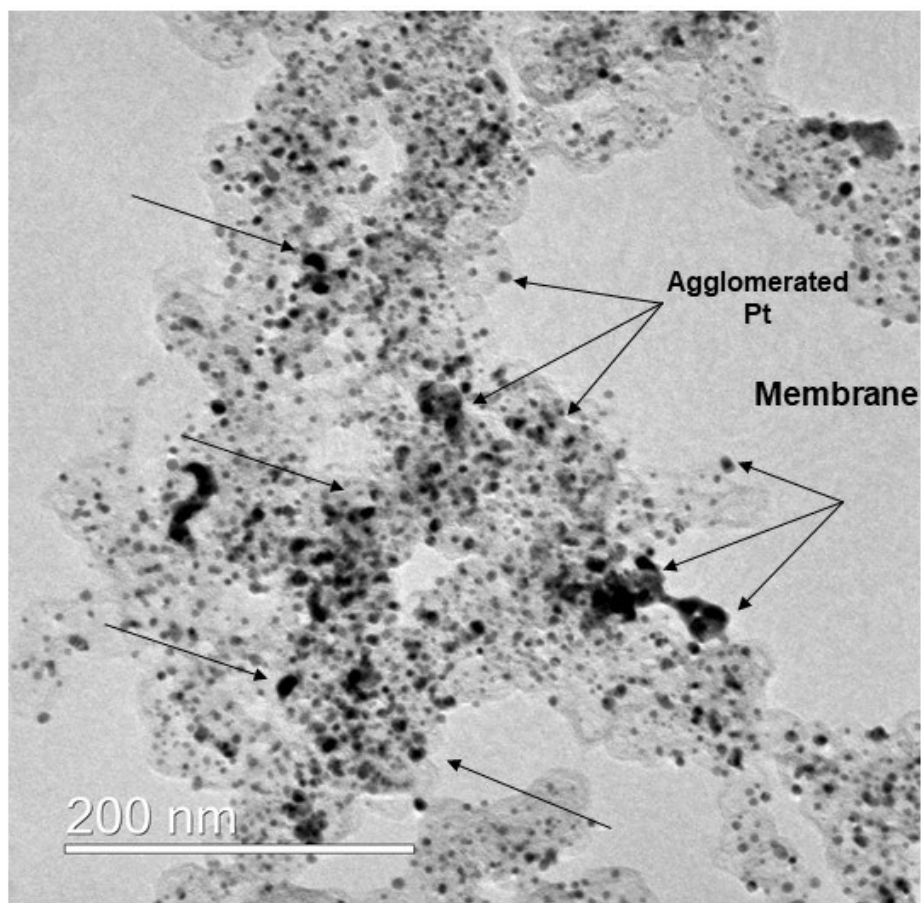


Figure S 1. TEM image of Pt/C cathode MEA after 144 h at OCV and short-circuiting, showing migration of Pt clusters towards the catalyst/membrane interface.

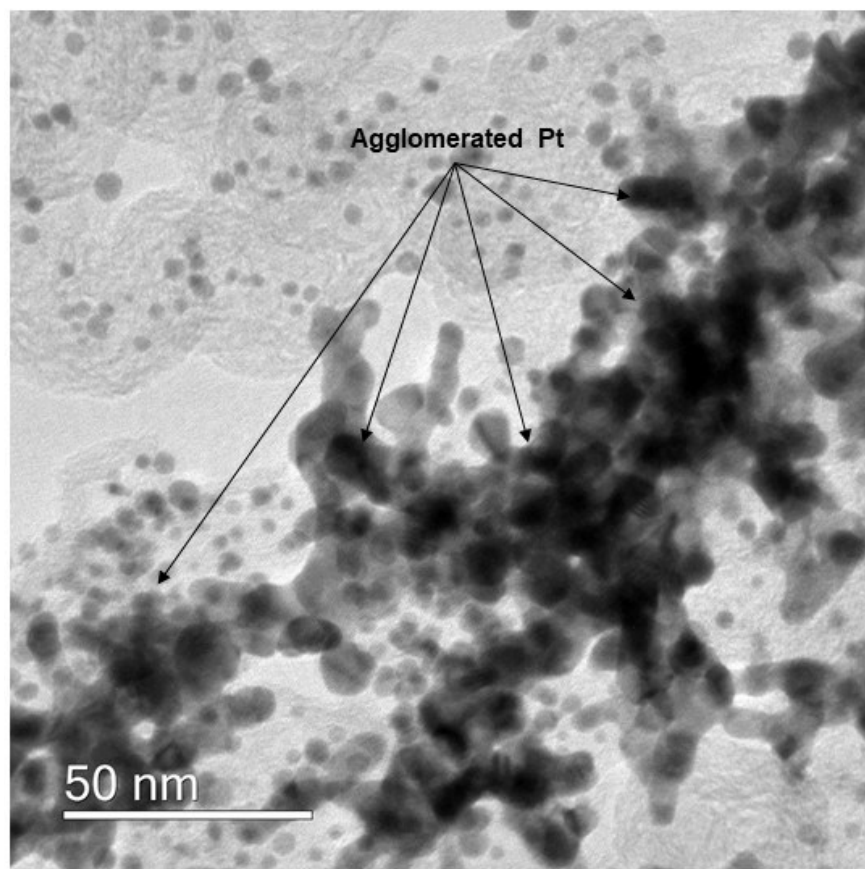


Figure S 2. Higher magnification TEM image of Pt/C cathode MEA after 144 h at OCV and short-circuiting, focusing on Pt agglomerates.

S2. XPS

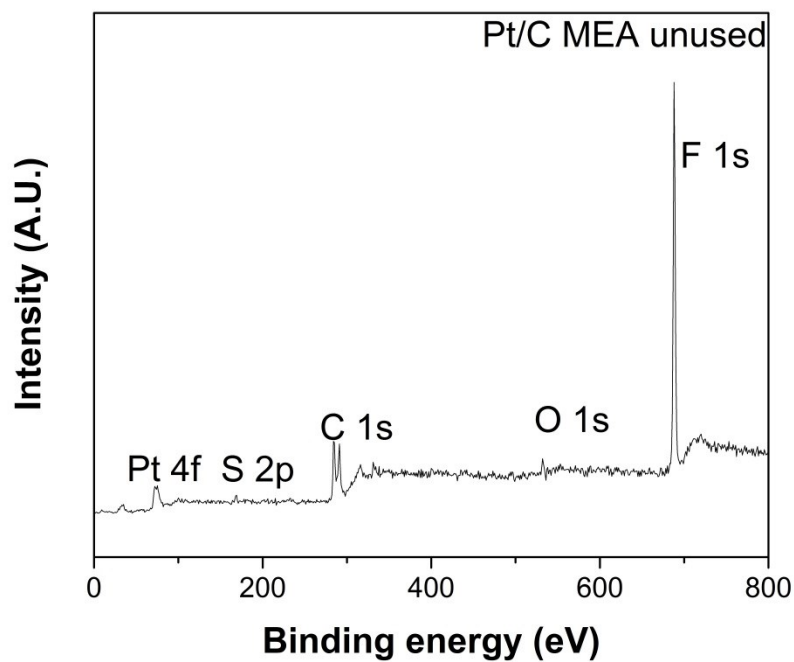


Figure S 3. XPS survey spectrum of the unused cathode MEA.

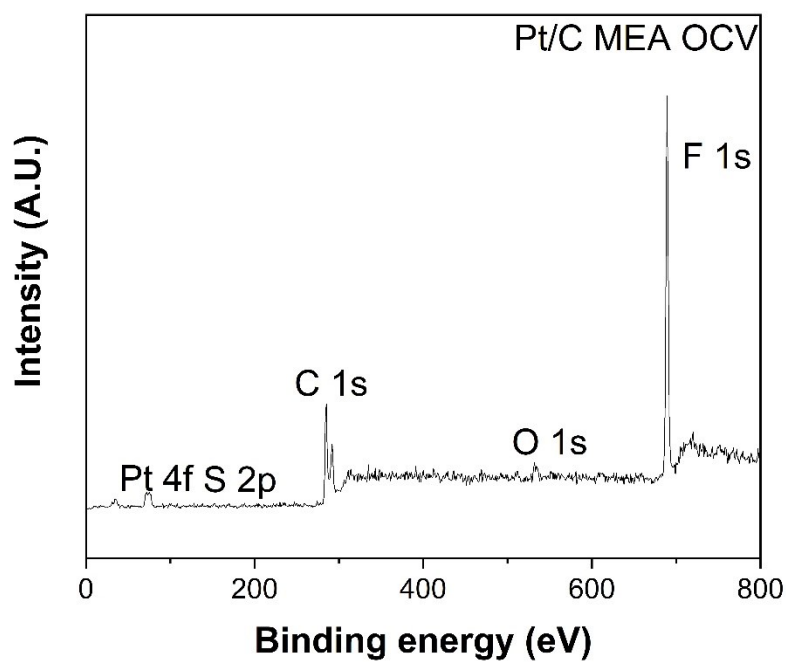


Figure S 4. XPS survey spectrum of the cathode MEA after PEMFC under OCV measurement.

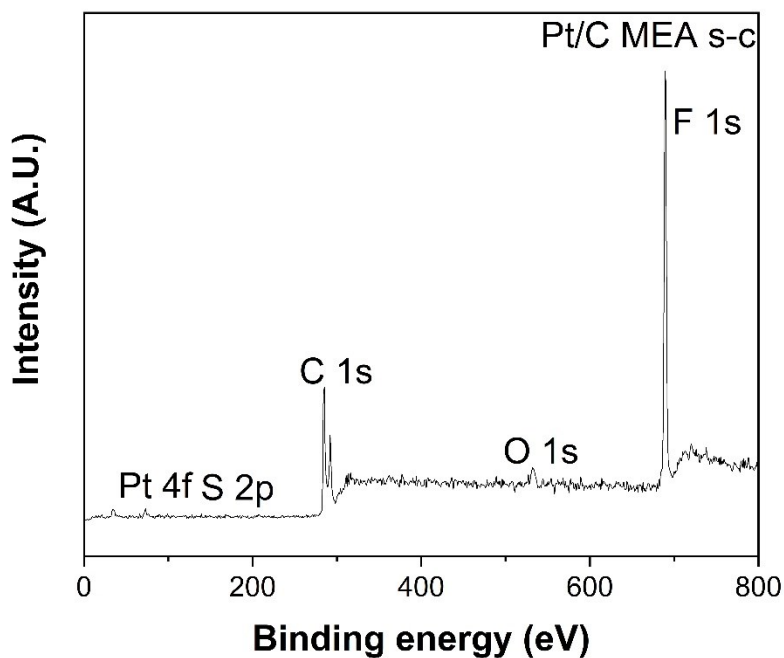


Figure S 5. XPS survey spectrum of the cathode MEA after PEMFC subjected to OCV and short-circuiting.

Table S 1. XPS chemical state information obtained from the platinum spectrum of the cathode MEA before and after OCV, with and without short-circuiting.

Element	Species	Atomic concentration % per element		
		Unused	OCV	OCV & Short-circuiting
Pt	Metallic	100	61.78	42.22
	Oxidized	0	38.22	57.78

S3. Polarization curves of PEMFCs under OCV, with or without short-circuiting

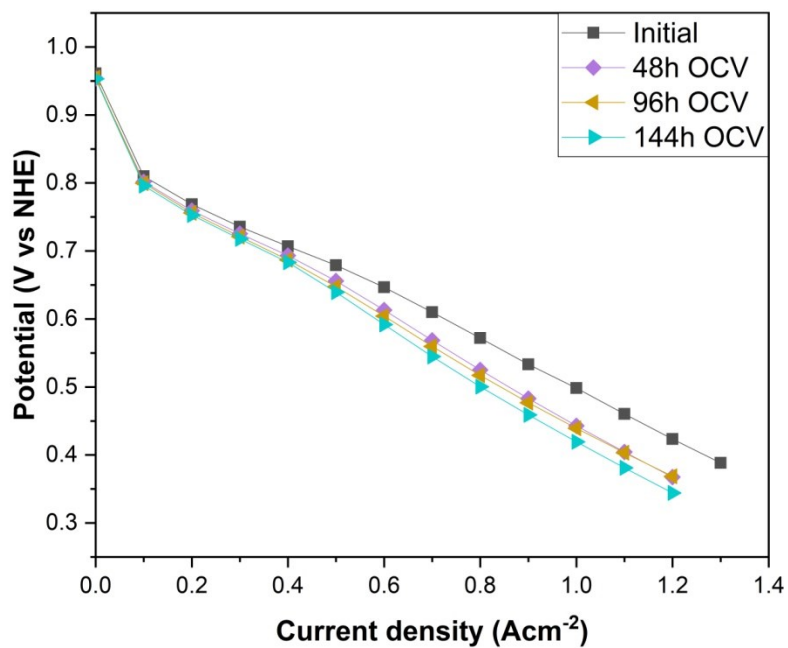


Figure S 6. Polarization curves for PEMFC under OCV. Experimental conditions: 35^oC cell temperature, 100% RH, 0.1 l min⁻¹ gas flow rate in the anode and cathode, and 0.4 mg_{Pt} cm⁻² loading in the anode and cathode.

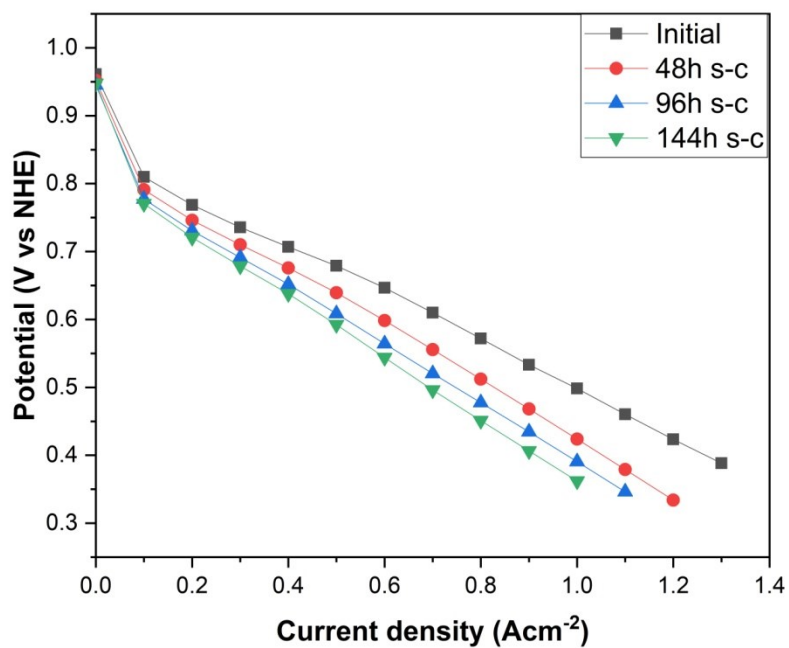


Figure S 7. Polarization curves for PEMFC under OCV and short-circuiting. Experimental conditions: 35°C cell temperature, 100% RH, 0.1 l min⁻¹ gas flow rate in the anode and cathode, and 0.4 mg_{Pt} cm⁻² loading in the anode and cathode.

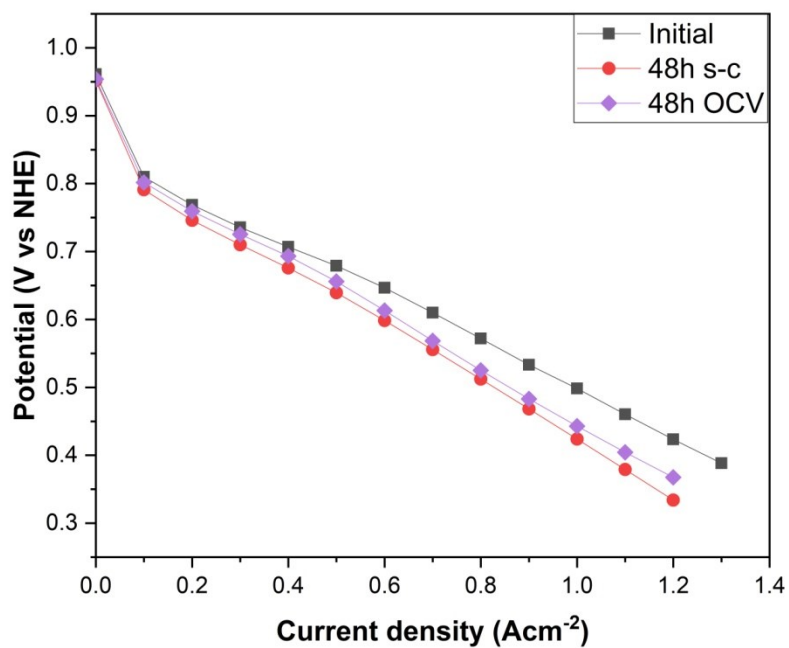


Figure S 8. Polarization curves for PEMFC under OCV with and without short-circuiting for 48 h. Experimental conditions: 35°C cell temperature, 100% RH, 0.1 l min⁻¹ gas flow rate in the anode and cathode, and 0.4 mg_{Pt} cm⁻² loading in the anode and cathode.

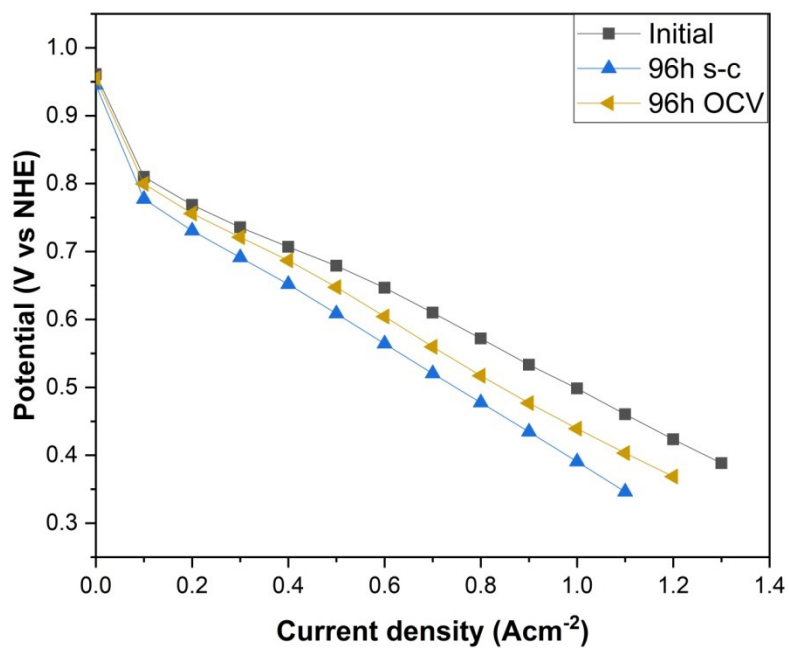


Figure S 9. Polarization curves for PEMFC under OCV with and without short-circuiting for 96 h. Experimental conditions: 35°C cell temperature, 100% RH, 0.1 l min⁻¹ gas flow rate in the anode and cathode, and 0.4 mg_{Pt} cm⁻² loading in the anode and cathode.

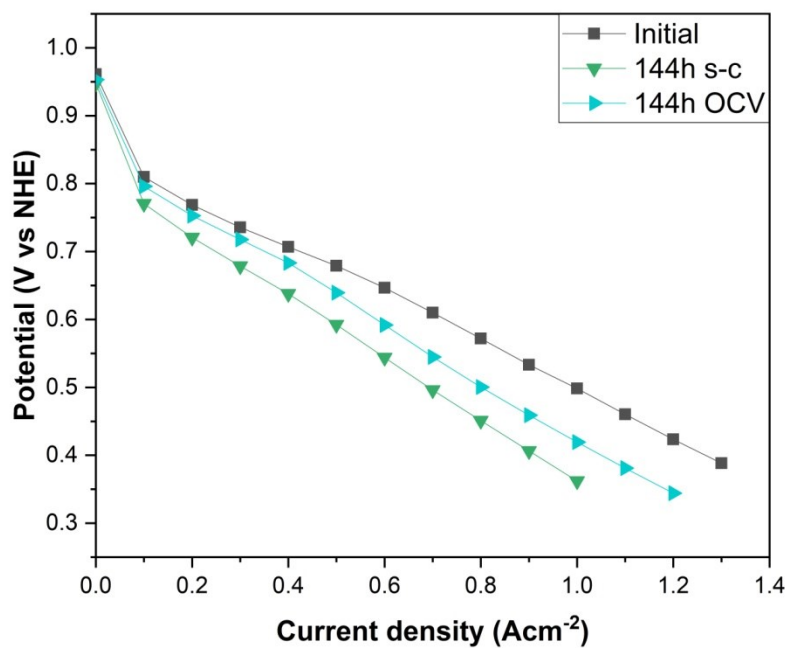


Figure S 10. Polarization curves for PEMFC under OCV with and without short-circuiting for 96 h. Experimental conditions: 35°C cell temperature, 100% RH, 0.1 l min⁻¹ gas flow rate in the anode and cathode, and 0.4 mg_{Pt} cm⁻² loading in the anode and cathode.