

Supporting Information

Platinum Nanoparticles Wrapped in Carbon-Dot-Films as Oxygen Reduction Reaction Catalysts Prepared by Solution Plasma Sputtering

Yuanyuan Liu,^a Zhunda Zhu,^a Pengfei Wang,^a Zhuoya Deng,^a Jiangqi Niu,^b Yasuyuki
Sawada,^{a,b} and Nagahiro Saito^{a,b,c,d*}

^aDepartment of Chemical Systems Engineering, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan;

^bInstitute of Innovation for Future Society, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan;

^cDepartment of International Collaborative Program in Sustainable Materials and Technology for Industries between Nagoya University and Chulalongkorn University, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan;

^dConjoint Research Laboratory in Nagoya University, Shinshu University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan.

*Corresponding Author: Nagahiro Saito: E-mail: saito.nagahiro.z7@f.mail.nagoya-u.ac.jp

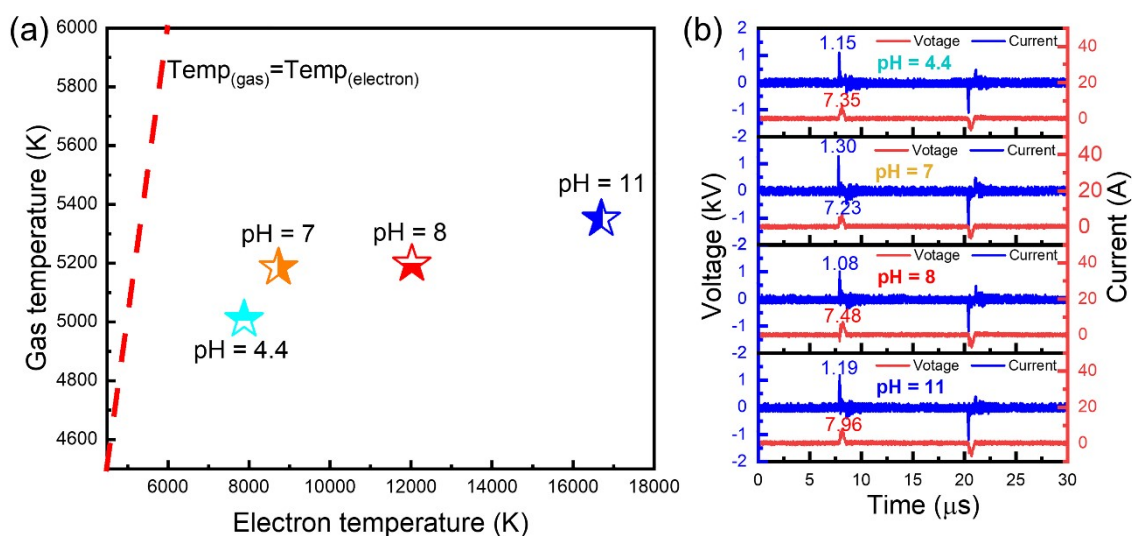


Fig. S1. (a) Relationship between gas temperature and electron temperature; (b) Current–voltage (I–V) curves in one cycle during discharge. The linear dashed line described by $Temp_{(gas)} = Temp_{(electron)}$ show the equilibrium state.

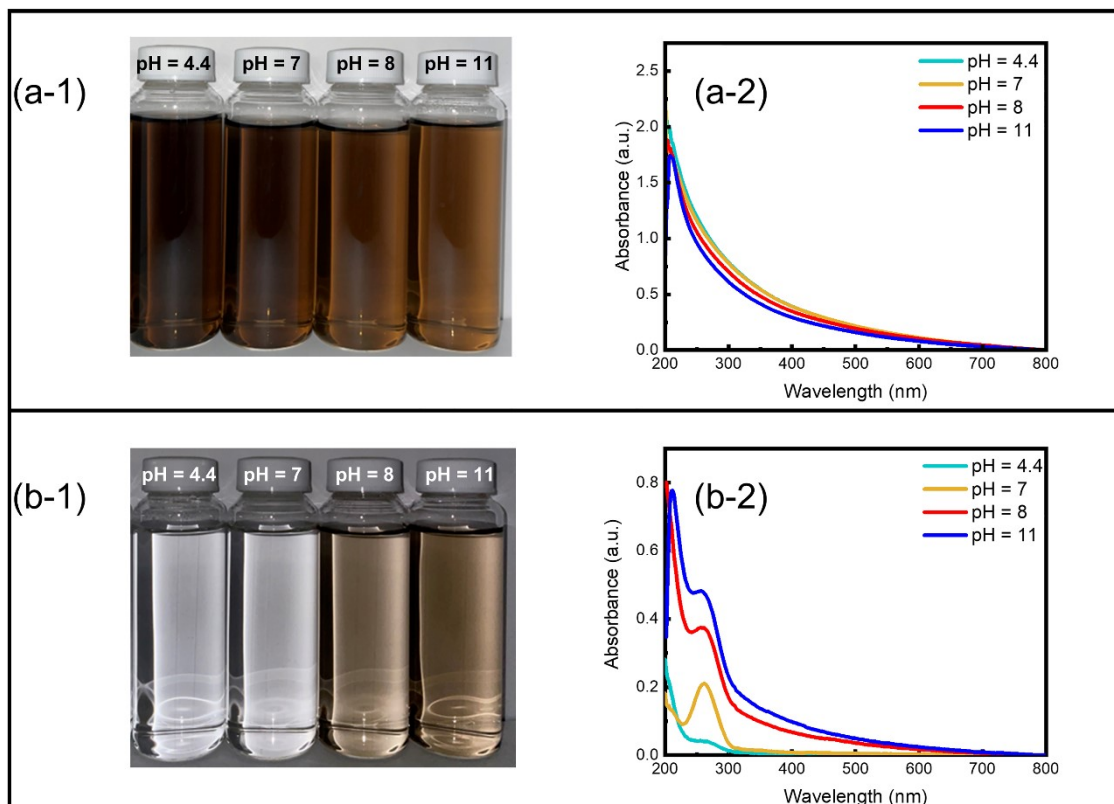


Fig. S2. (a-1) Solution photo after solution plasma sputtering; (b-1) Solution photo after 100,000 rpm ultracentrifugation; (a-2) and (b-2) Absorbance of (a-1) and (b-1), respectively.

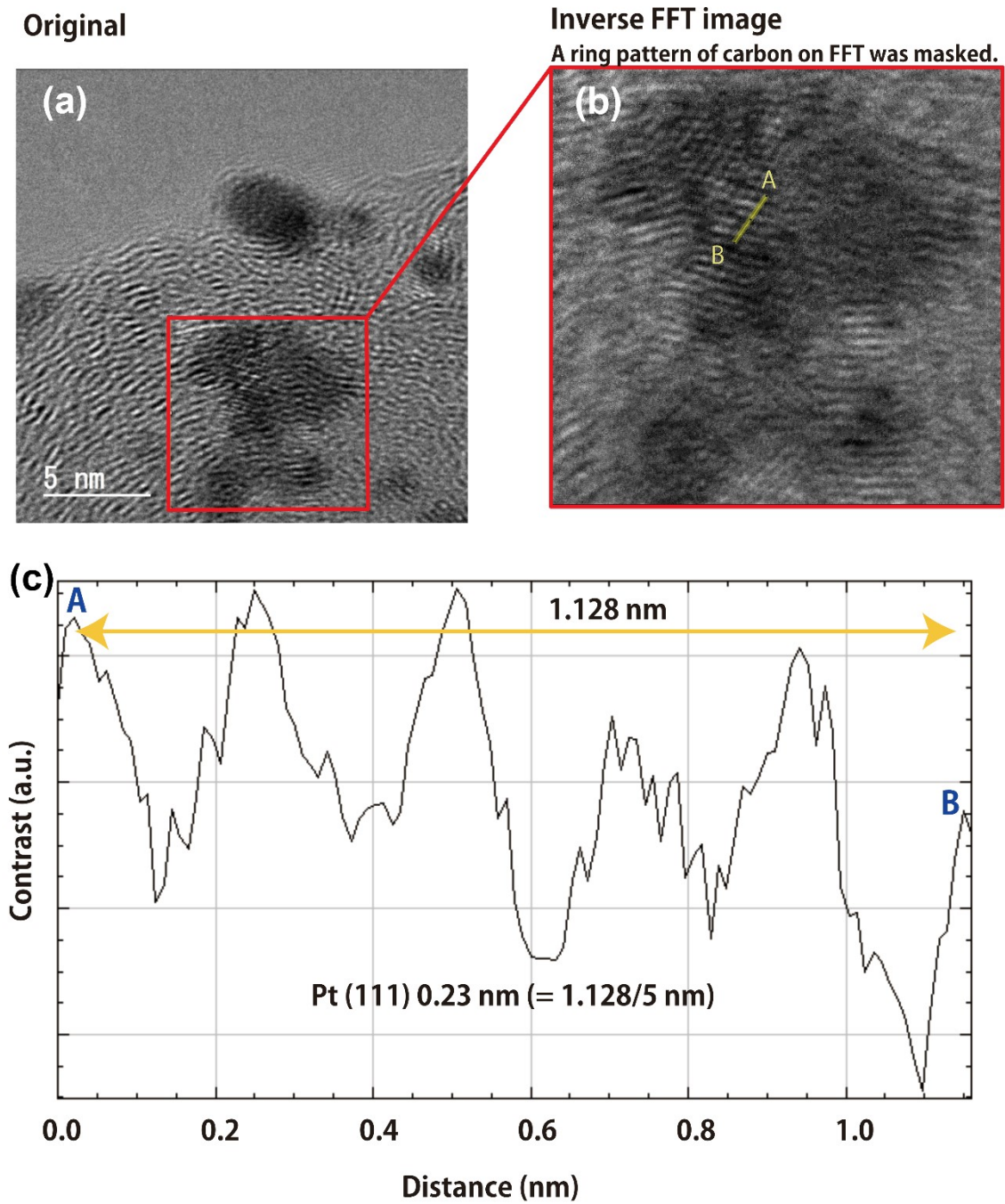


Fig. S3. TEM image of pH = 8. (a) original TEM image; (b) inverse Fourier Transform (FFT) after removing spatial frequencies from carbons on FFT, (c) the measurement results of the plane spacing.

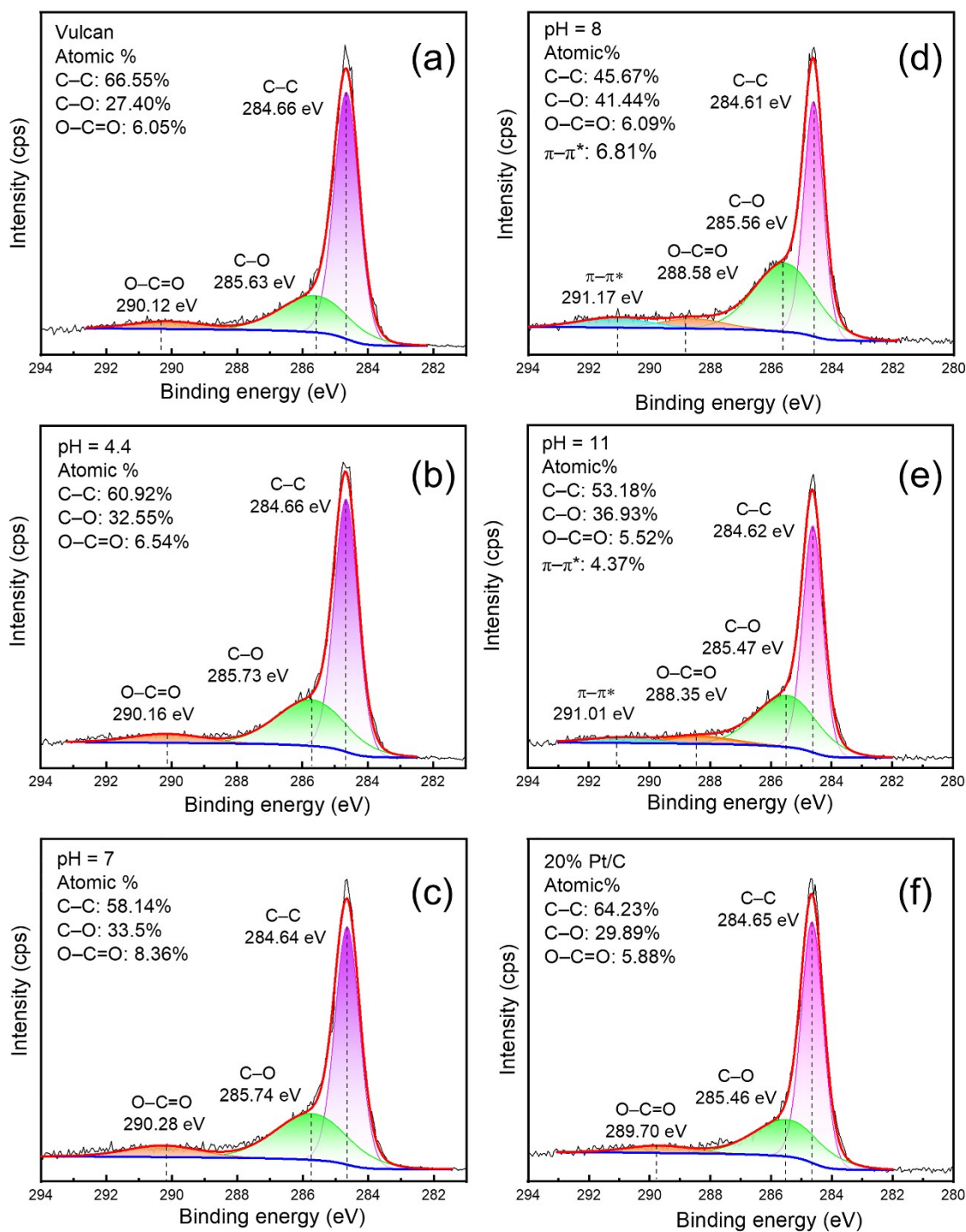


Fig. S4. X-ray photoelectron spectra of C 1s for the obtained catalyst with (a) Vulcan support; (b) pH = 4.4; (c) pH = 7; (d) pH = 8; (e) pH = 11; (f) 20 wt% commercial Pt/C obtained by the Gaussian deconvolutions.

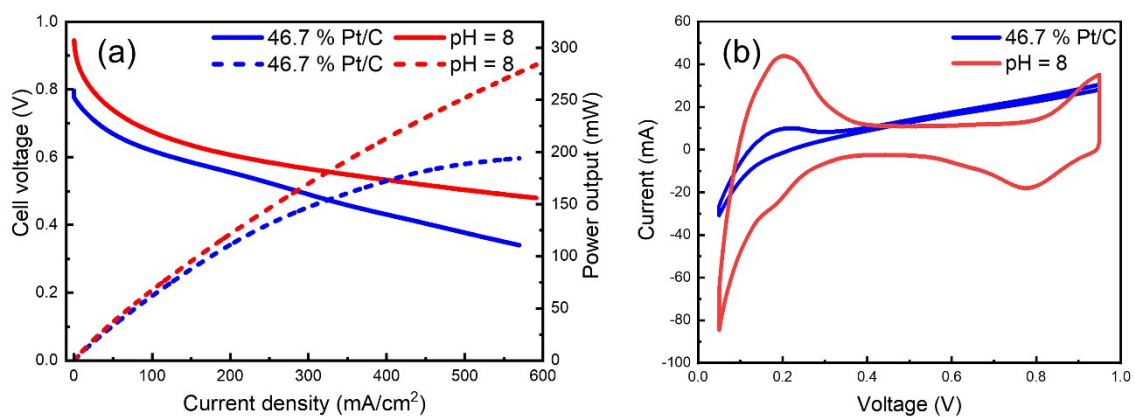


Fig. S5. Output performance of the fuel cell using commercial 46.7 wt.% Pt/C as an anode with the pH = 8 sample and commercial 46% Pt/C as the cathode. (a) I-V and power output curves under H₂-O₂ atmosphere in membrane electrode assembly (MEA); (b) cyclic voltammetry curves under H₂-N₂ atmosphere in MEA.

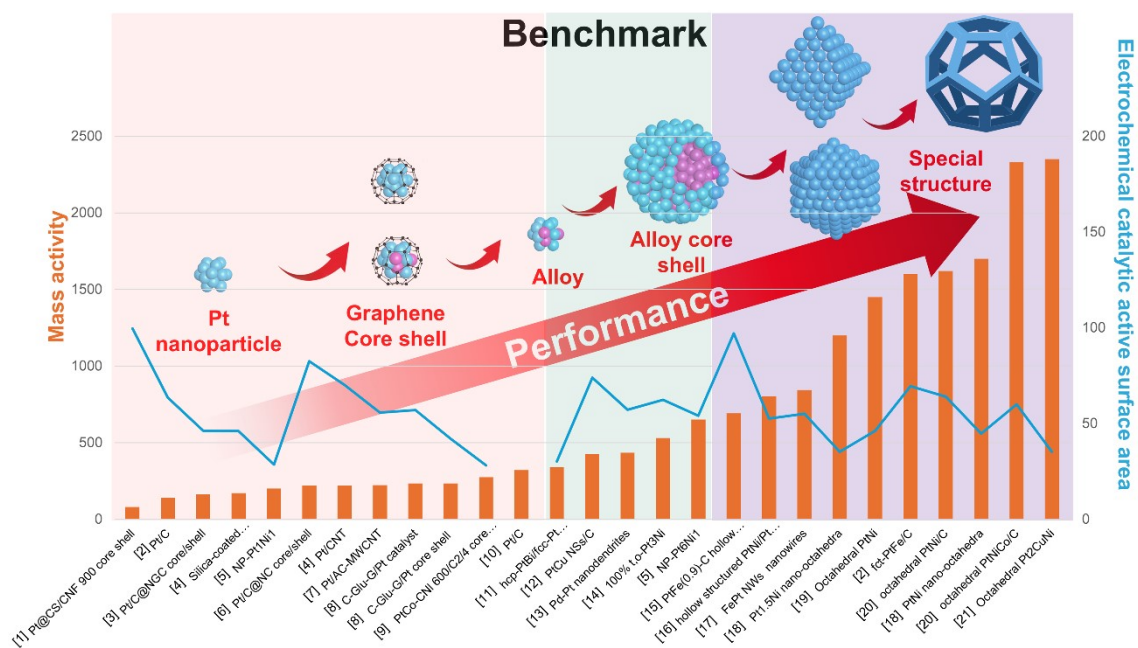


Fig. S6. Benchmark of the oxygen reduction reaction performance of different catalysts from references. ¹⁻²¹

Table S1. Ink composition for the membrane electrode assembly measurements.

	Weight (mg)	H₂O (mg)	IPA (mg)	Nafion (mg)	Membrane thickness (μm)
Commercial Pt/C (46.7 wt%)	75	600	770	200	150 and 50
pH = 8 (Pt% = 8.4%)	30	243	310.7	135	350

Table S2. Loading amount on electrodes and membrane electrode assembly measurement performances.

	Anode	Loading amount (μg)	Cathode	Loading amount (μg)	ECSA (m^2/g)
Commercial Pt/C (46.7 wt%)	150 μm Commercial Pt/C (46 wt.%)	165	50 μm Commercial Pt/C (46 wt%)	33.0	Cannot be calculated
pH=8 (Pt% = 8.4%)	150 μm 46% Commercial Pt/C	162	350 μm pH = 8 Pt/C	20.4	223.20

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