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# Electronic Supplementary Information

## Oxygen reduction electrocatalysts sophisticated by using Pt nanoparticle-dispersed ionic liquids with electropolymerizable additives

Reiko Izumi,[a] Yu Yao,[a] Tetsuya Tsuda,*[a] Tsukasa Torimoto[b] and Susumu Kuwabata*[a]

[a]Department of Applied Chemistry, Graduate School of Engineering, Osaka University
2-1 Yamada-oka, Suita, Osaka 565-0871, Japan
*E-mail: kuwabata@chem.eng.osaka-u.ac.jp (SK); ttsuda@chem.eng.osaka-u.ac.jp (TT)

[b]Department of Materials Chemistry, Graduate School of Engineering, Nagoya University
Furo-cho, Chikusa-ku, Nagoya, Aichi 464-8603, Japan

**Supplementary Information Contents:**

Fig. S1 – S6 p. 2
Caption for Movie S1 p. 8

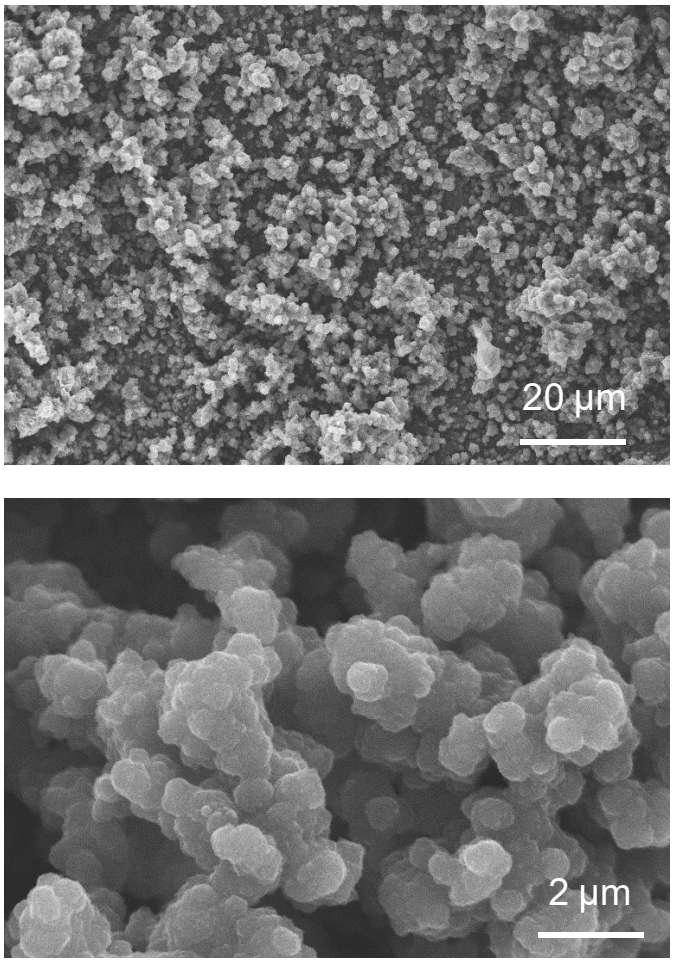


**Fig. S1** SEM images of the electrochemically-treated [DPA][$HSO_4$] after EtOH washing.

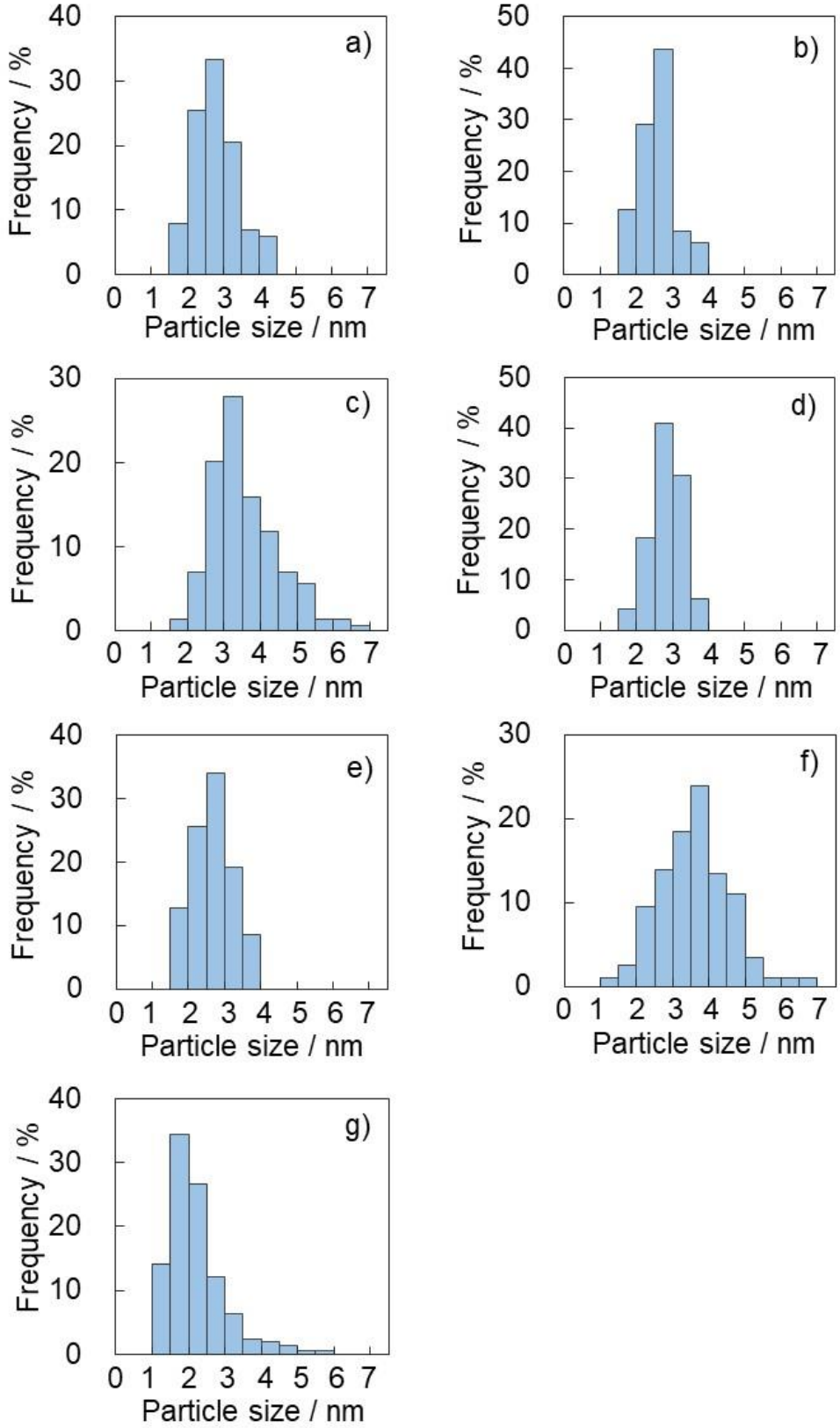


**Fig. S2** Pt size distribution of the Pt nanoparticle-supported carbon catalysts used in this research: (a) Pt/[$PhNH_3$][$HSO_4$]·**1**/C, (b) Pt/3MT·**1**/C, (c) Pt/diphenylamine·**2**/C, (d) Pt/[DPA][$HSO_4$]·**1**/C, (e) Pt/–·**1**/C, (f) Pt/–·**2**/C and (g) TEC10V30E.

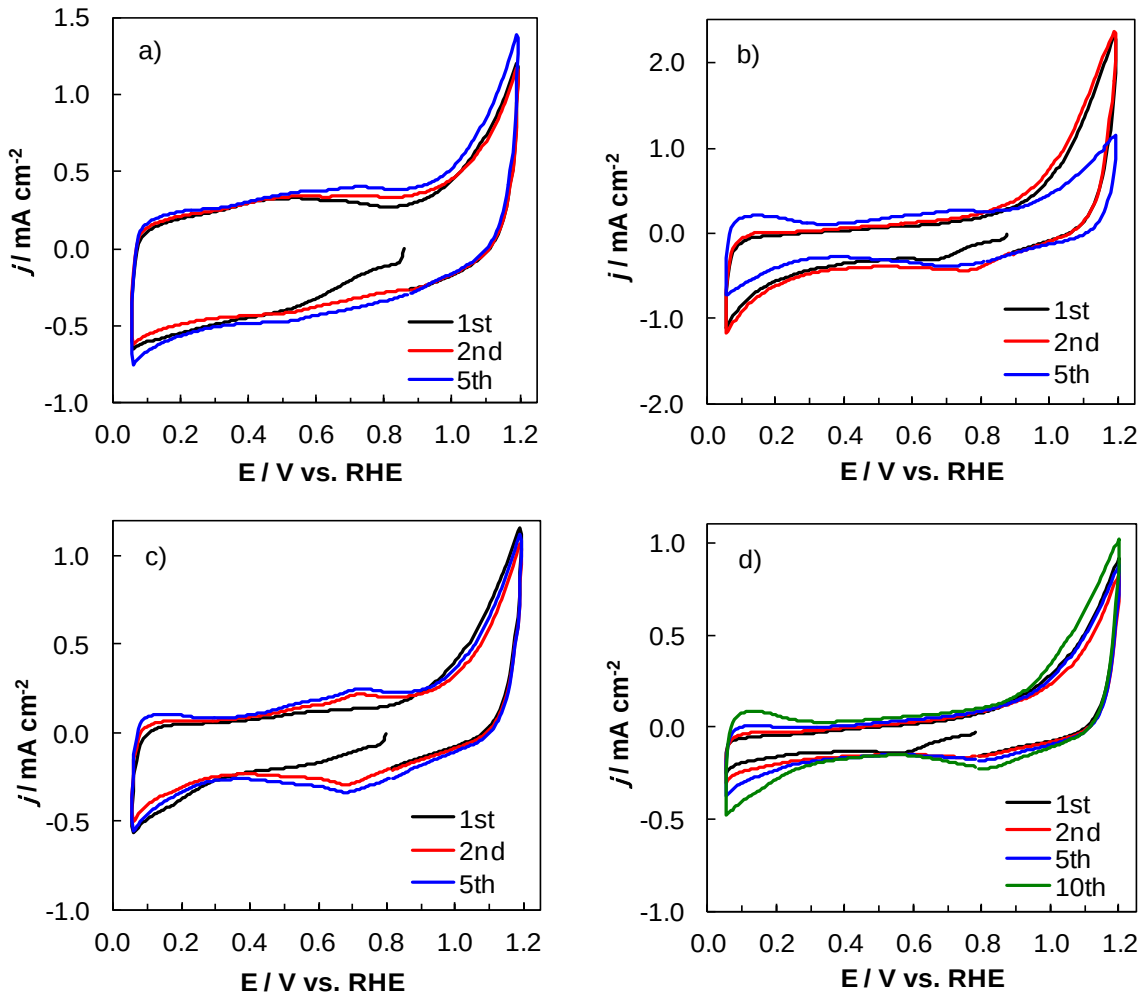


**Fig. S3** Cyclic voltammograms recorded at the different catalysts in a $N_2$-saturated 0.1 M $HClO_4$ aqueous solution during the electrochemical cleaning process. The catalysts were: (a) Pt/[$PhNH_3$][$HSO_4$]·**1**/C, (b) Pt/3MT·**1**/C, (c) Pt/diphenylamine·**2**/C and (d) Pt/–·**2**/C. The scan rate was 50 mV $s^{-1}$.

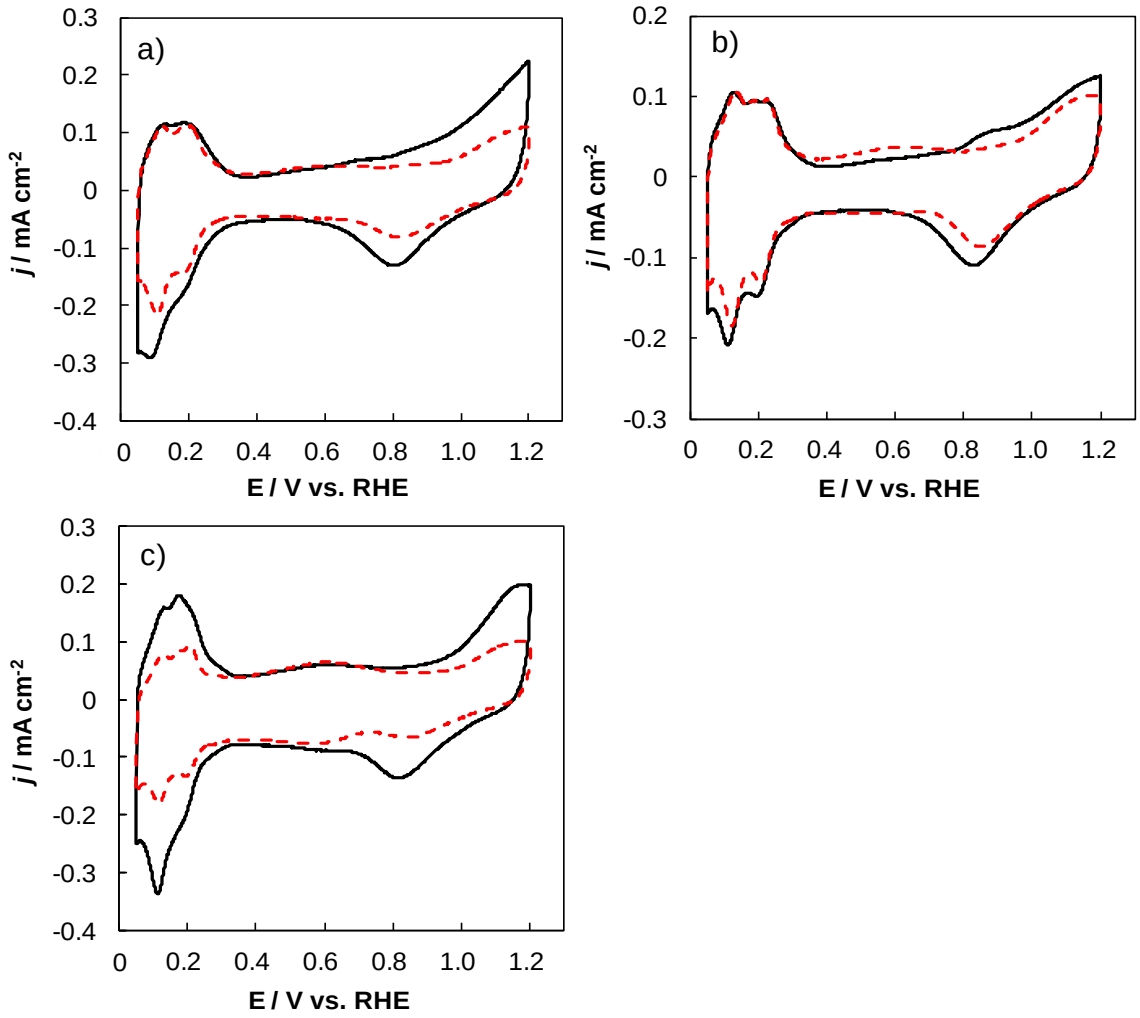


**Fig. S4** Cyclic voltammograms recorded at the different catalysts in a $N_2$-saturated 0.1 M $HClO_4$ aqueous solution before (—) and after (- - -) the durability test. The catalysts were: (a) Pt/–·**1**/C, (b) Pt/–·**2**/C and (c) TEC10V30E. The scan rate was 10 mV $s^{-1}$.

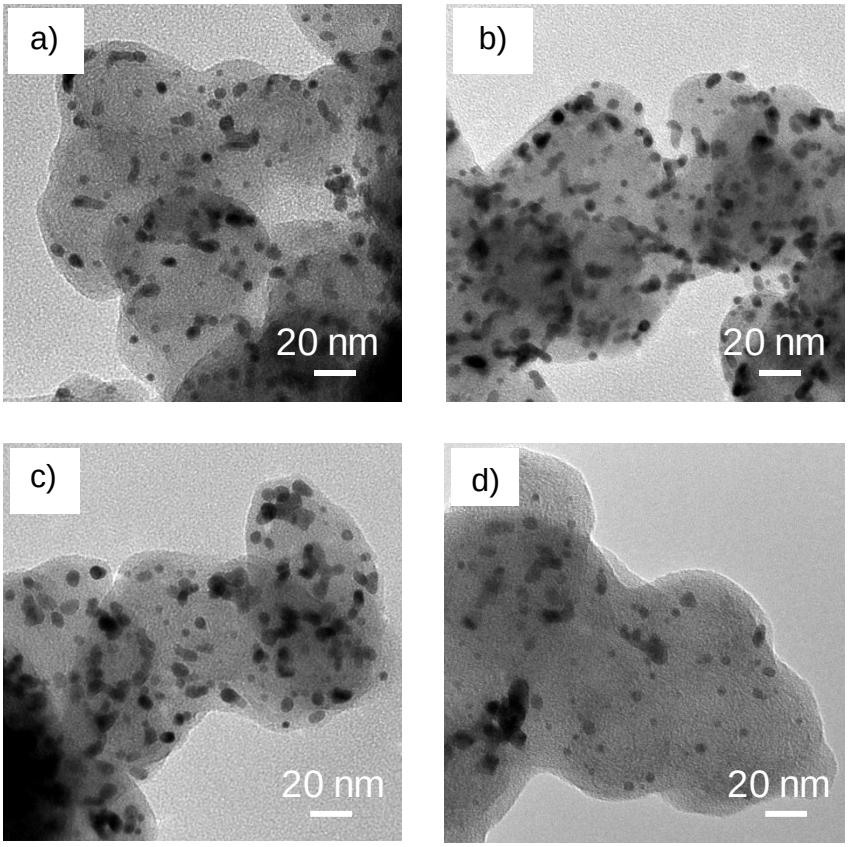


**Fig. S5** TEM images of the Pt nanoparticle-supported carbon electrocatalysts after the durability test (15,000 cycles): (a) Pt/[$PhNH_3$][$HSO_4$]·**1**/C, (b) Pt/3MT·**1**/C, (c) Pt/diphenylamine·**2**/C and (d) TEC10V30E.

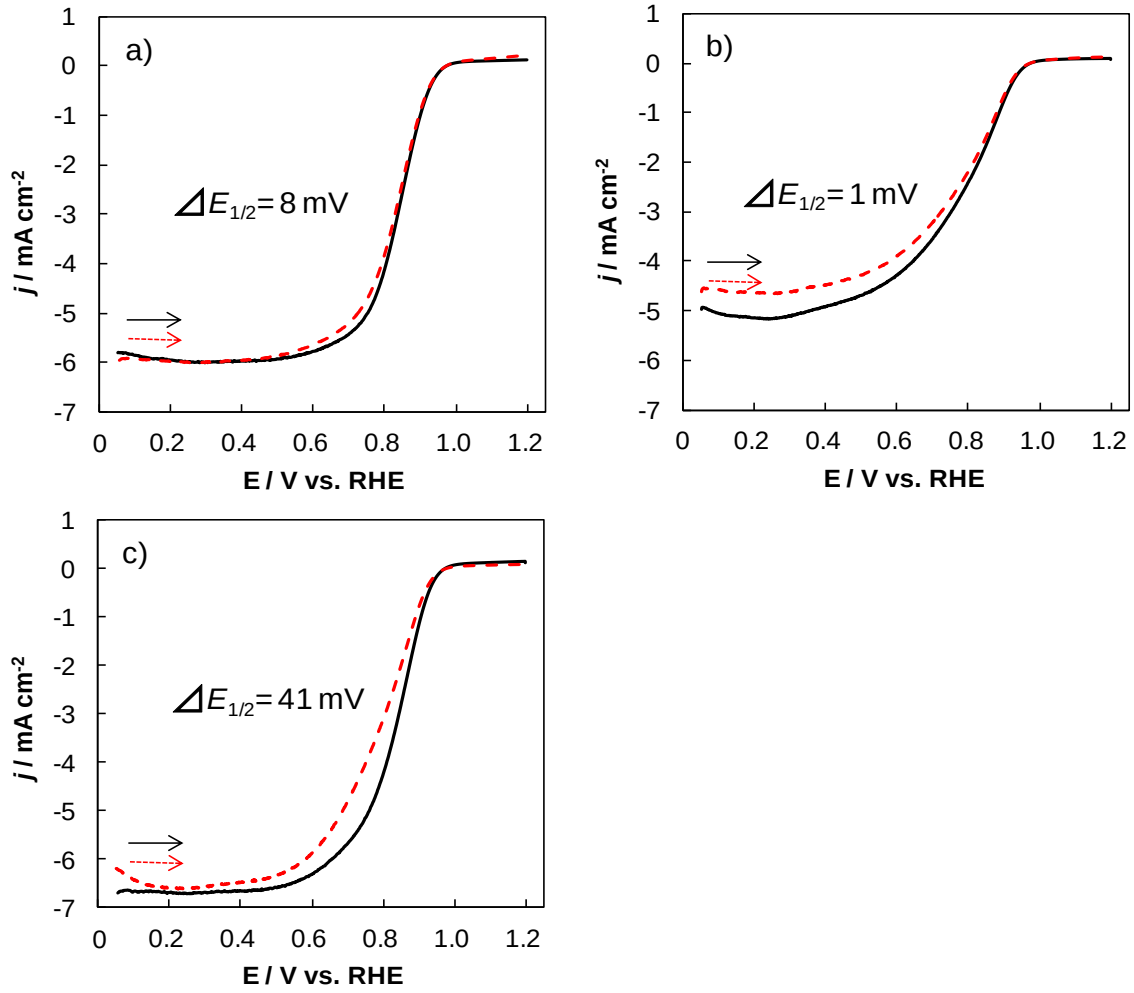


**Fig. S6** Hydrodynamic voltammograms recorded for the different catalysts in an $O_2$-saturated 0.1 M $HClO_4$ aqueous solution before (—) and after (- - -) the durability test. The catalysts were: (a) Pt/–·**1**/C, (b) Pt/–·**2**/C and (c) TEC10V30E. The revolution speed was 1,600 rpm. The scan rate was 10 mV $s^{-1}$.

**Caption for Movie S1**

**Movie S1** Visual changes in the [DPA][$HSO_4$]-coated ITO electrode during the electropolymerization test. Potential cycling was conducted at 50 mV $s^{-1}$ between 0.05 and 1.15 V.