Supporting Information for

Ultrathin Oxide Shell Coating of Metal Nanoparticles Using Ionic Liquid/Metal Sputtering

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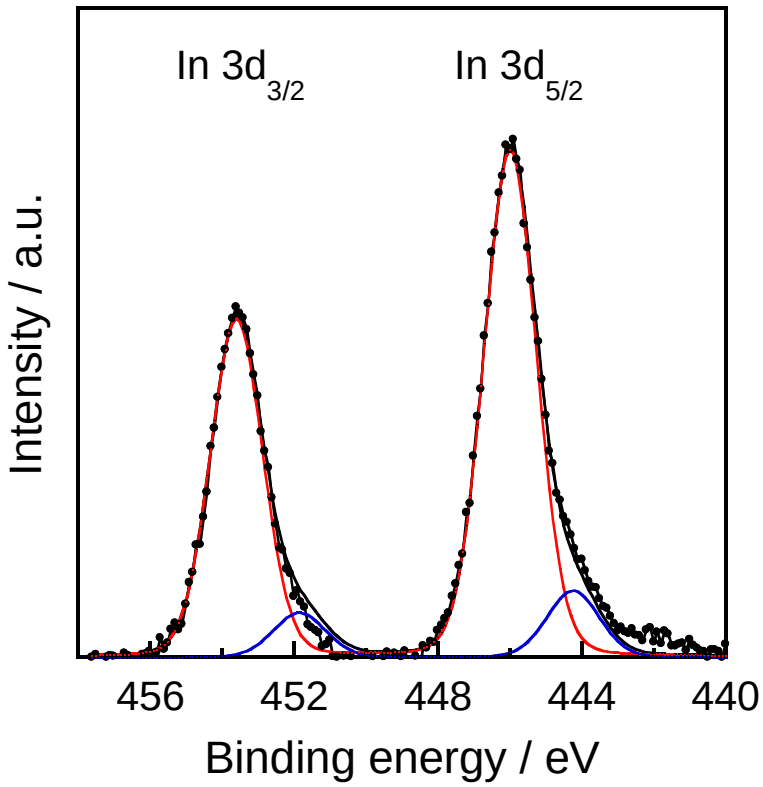

Fig. S1 Representative XPS spectrum of In in the as-prepared Au@In_2O_3.

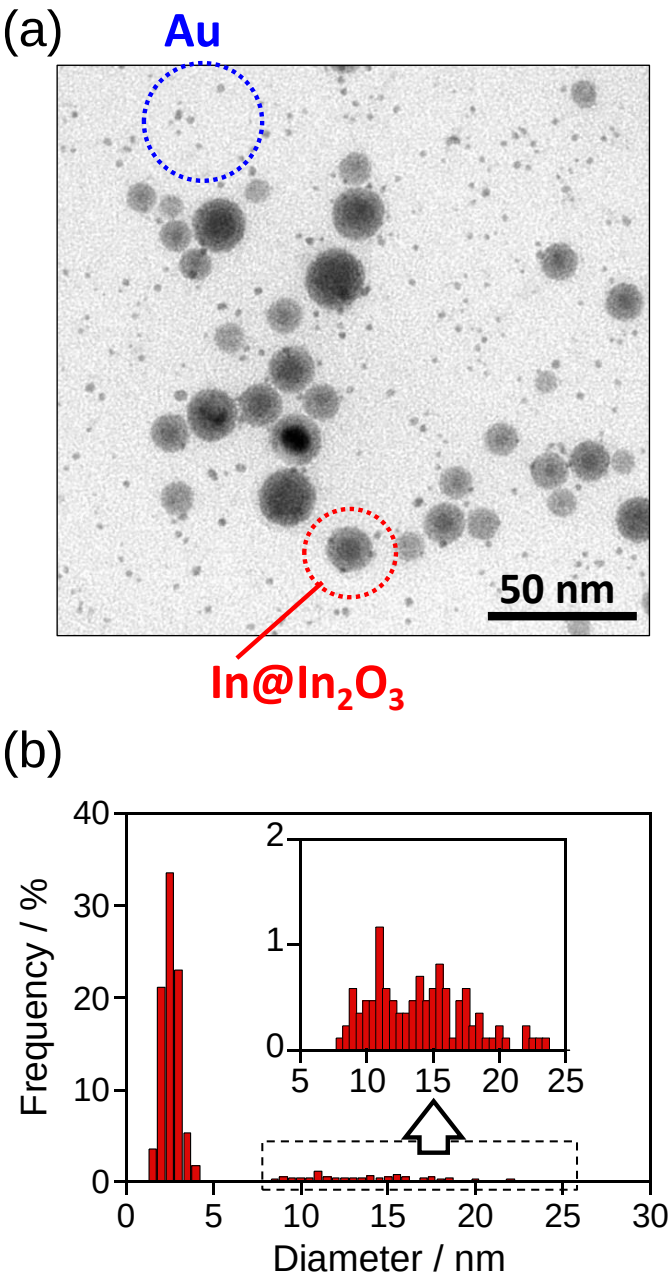

Fig. S2 (a) TEM image of particles prepared by sequential sputter deposition of In and Au in EMI-BF4. (b) Size distribution of the particles shown in panel a.

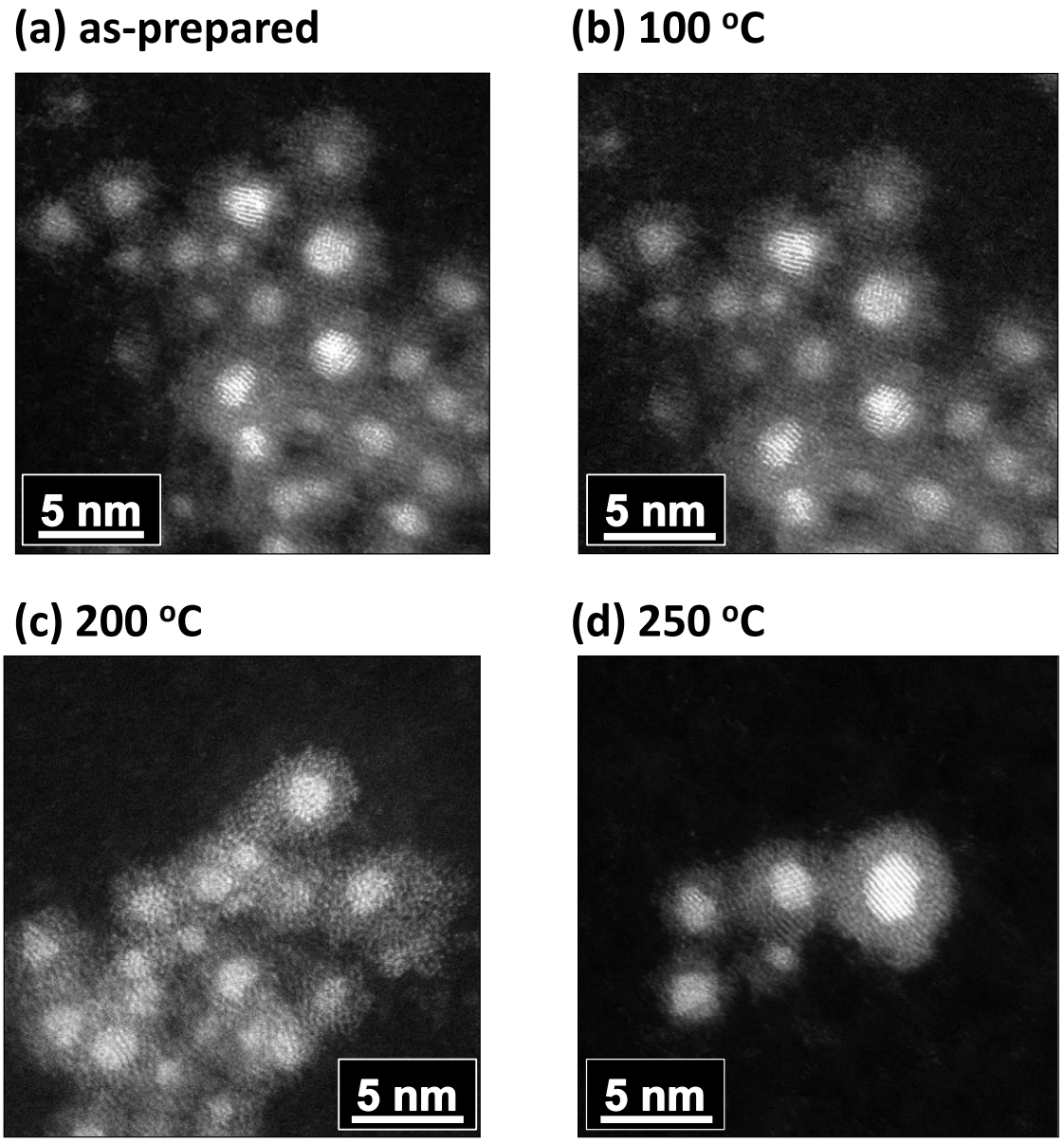

Fig. S3 HAADF-STEM images of heat-treated AuPd@In_2O_3 presenting a 0.95-nm-thick In_2O_3 shell. As-prepared (a) and heat-treated particles at 100 (b), 200 (c), and 250 ºC (d).

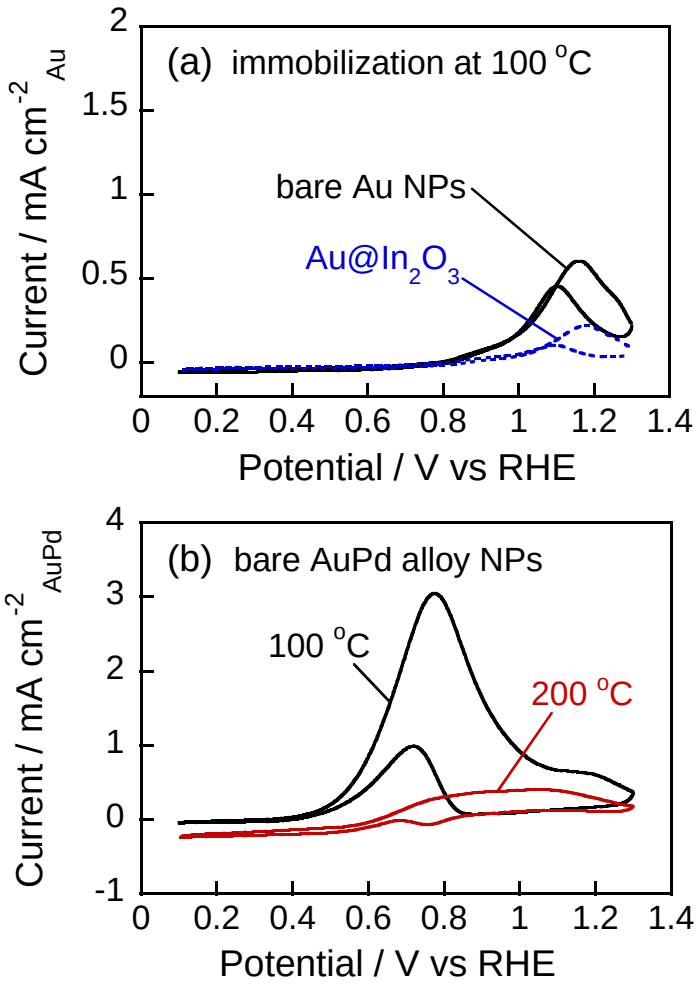

Fig. S4 Cyclic voltammograms for ethanol oxidation in 0.50 mol dm^{-3} KOH aqueous solution containing 0.50 mol dm^{-3} ethanol. HOPG electrodes used were modified with bare Au or Au@In_2O_3 particles at 100 °C (a) and modified with bare AuPd particles at 100 or 200 °C (b). Au@In_2O_3 particles were prepared by the In sputtering for 10 min.

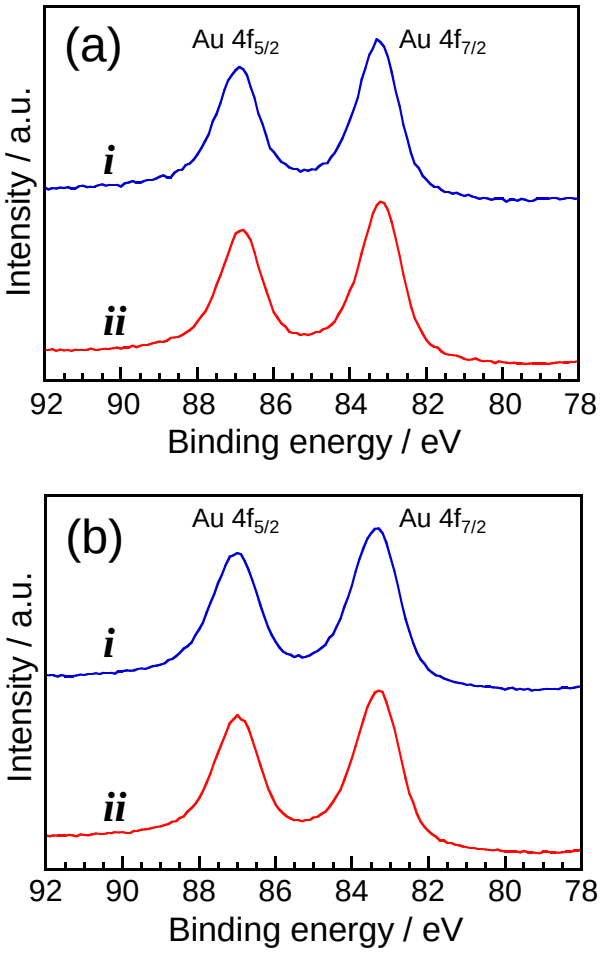

Fig. S5 XPS spectra for Au 4f of bare AuPd particles (a) and AuPd@In_2O_3 particles covered with a 0.79-nm-thick In_2O_3 shell (b) immobilized on HPOG electrodes at 100 ºC. The measurements were carried out (*i*) before and (*ii*) after cyclic voltammogram measurement shown in Fig. 7b with 100 cycles.

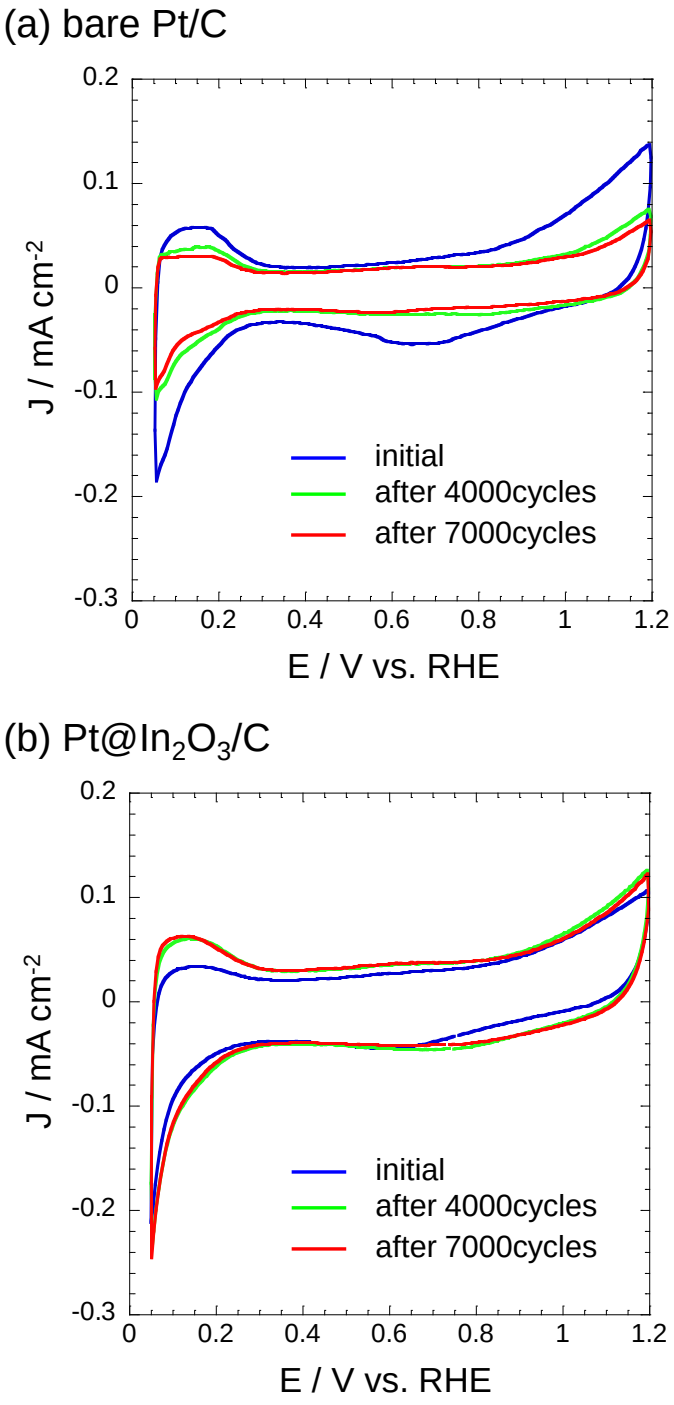

Fig. S6 Cyclic voltammograms of bare Pt/C (a) or $Pt@In_2O_3/C$ composites (b) in 0.10 mol dm^{-3} $HClO_4$ aqueous solution degassed with N_2 during the accelerated durability test of fuel cells. Potential sweep rate: 10 mV s^{-1}.