

Supporting Information

Pt/C-LiCoO₂ composites with ultralow Pt loadings as synergistic bifunctional electrocatalysts for the oxygen reduction and evolution reactions

Chao Su,^a Tao Yang,^b Wei Zhou,^c Wei Wang,^a Xiaomin Xu^c and Zongping Shao^{*ad}

^aDepartment of Chemical Engineering, Curtin University, Perth, Western Australia 6845, Australia.

^bCentre of Mechanical Technology and Automation (TEMA), Department of Mechanical Engineering, University of Aveiro, 3810-193, Aveiro, Portugal.

^cState Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemistry and Chemical Engineering, Nanjing Tech University, No. 5 Xin Mofan Road, Nanjing 210009, P. R. China.

^dState Key Laboratory of Materials-Oriented Chemical Engineering, College of Energy, Nanjing Tech University, No. 5 Xin Mofan Road, Nanjing 210009, P. R. China.

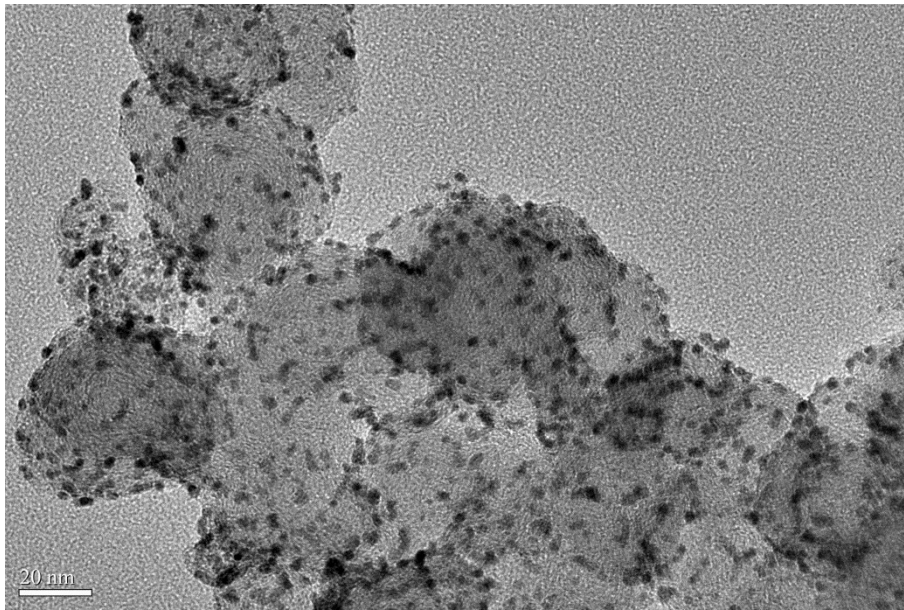


Fig. S1 Transmission electron microscopy (TEM) image of commercial 20 wt% Pt/C.

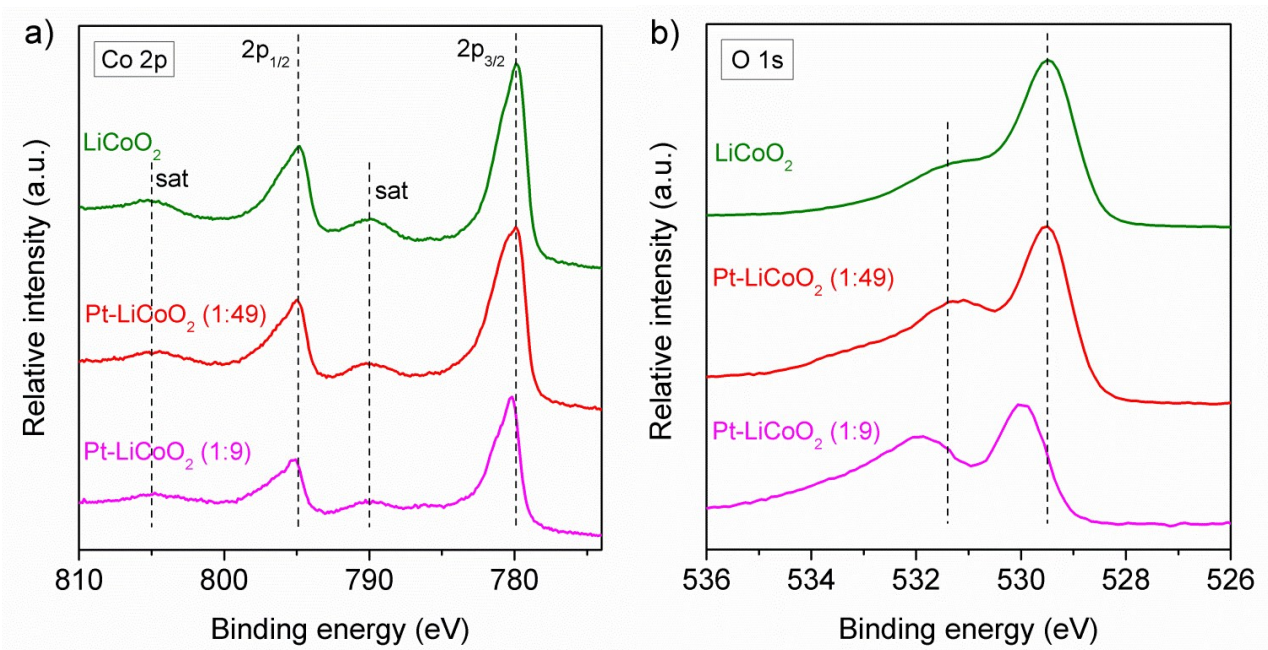


Fig. S2 a) Co 2p and b) O 1s X-ray photoelectron spectra (XPS) of LiCoO₂, Pt-LiCoO₂ (1:49) and Pt-LiCoO₂ (1:9) catalysts.

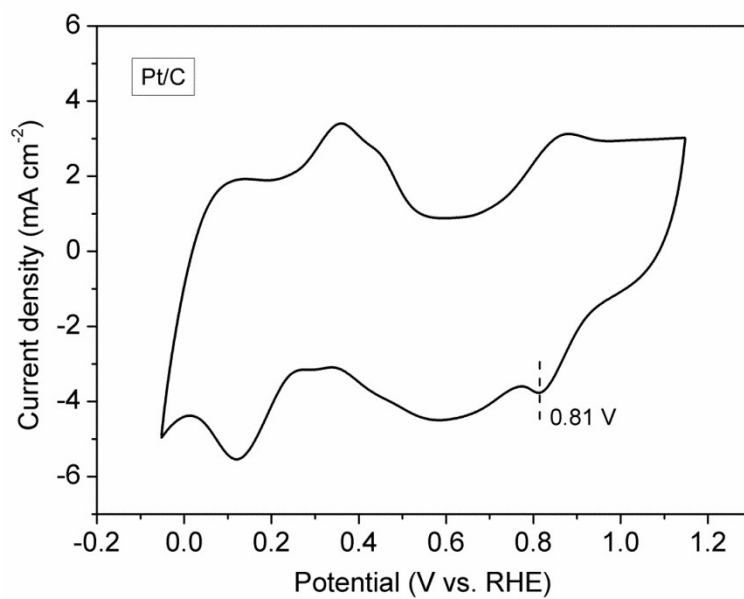


Fig. S3 Cyclic voltammogram (CV) curve of oxygen reduction reaction (ORR) on commercial 20 wt% Pt/C in an O₂-saturated 0.1 M KOH solution at a scan rate of 50 mV s⁻¹.

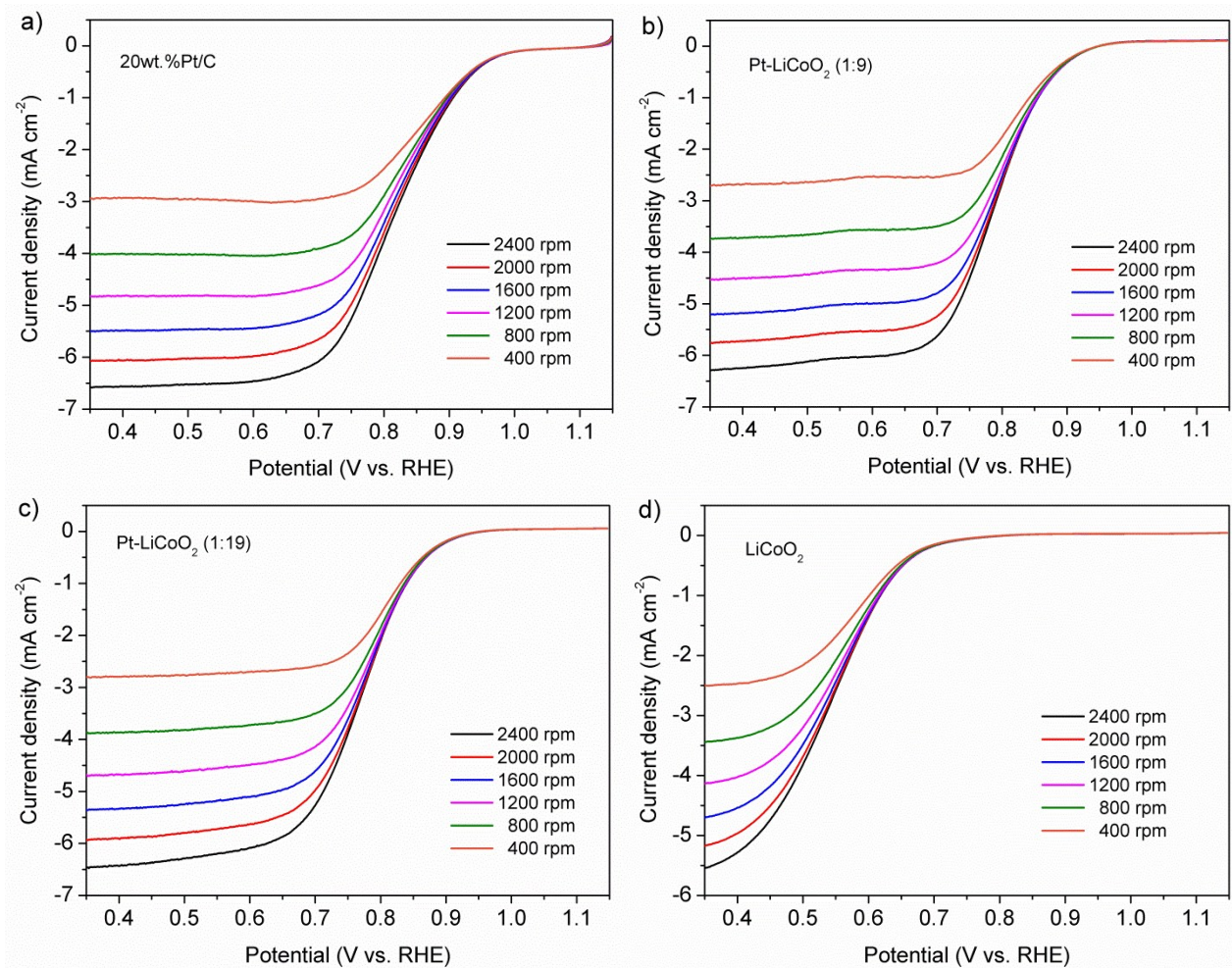


Fig. S4 Linear sweep voltammogram (LSV) curves of a) commercial 20 wt% Pt/C, b) Pt-LiCoO₂ (1:9), c) Pt-LiCoO₂ (1:19) and d) LiCoO₂ on the rotating disk electrode (RDE) at different rotating rates.

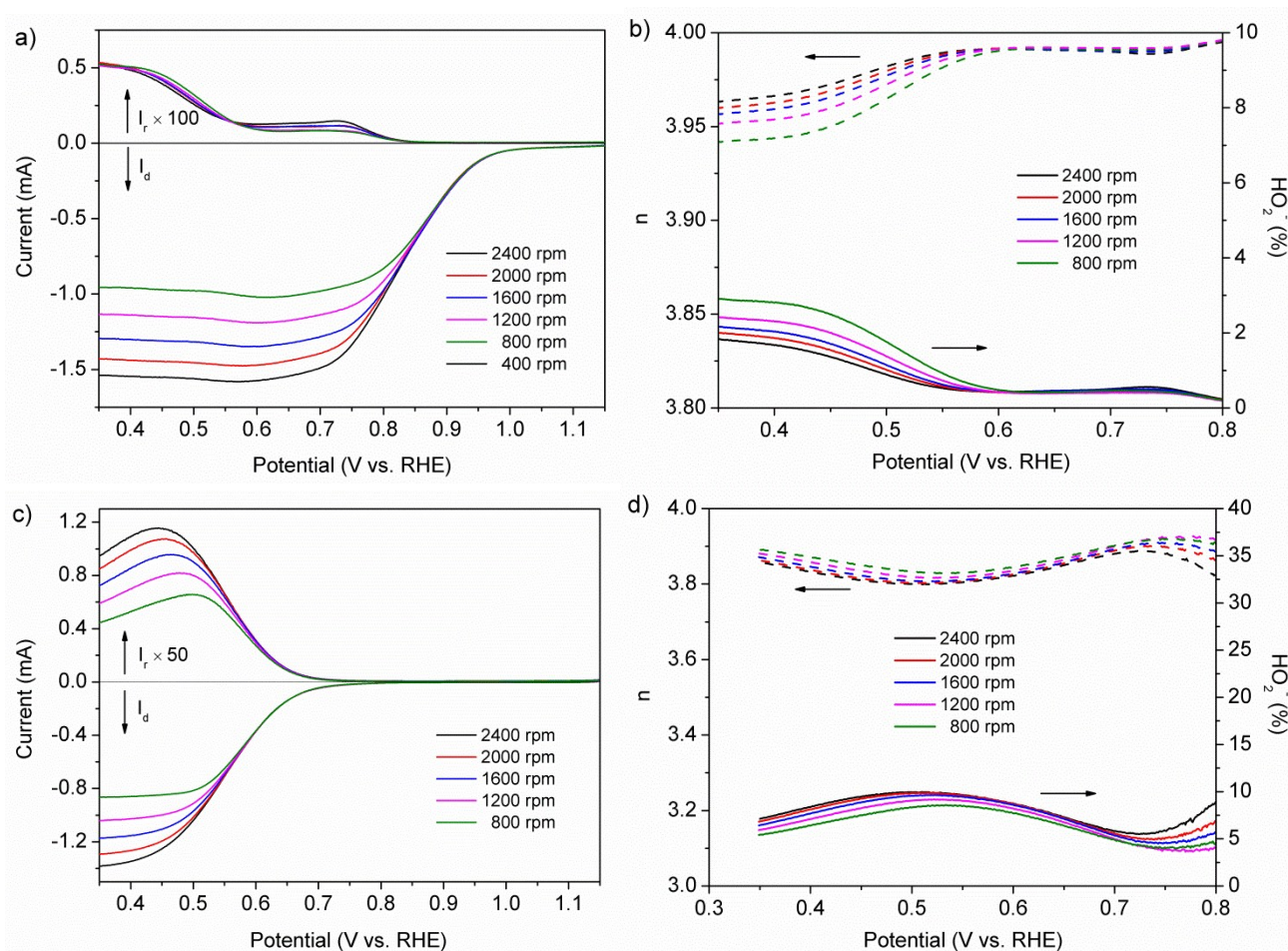


Fig. S5 a) & c) Disk (bottom) and ring currents (top, multiplied by 100) of a) commercial 20 wt% Pt/C and c) LiCoO₂ collected on the rotating ring-disk electrode (RRDE) at different rotating rates in O₂-saturated 0.1 M KOH electrolyte. b) & d) The electron transfer number (n, dash line) and percentage of HO₂⁻ (solid line) of b) commercial 20 wt% Pt/C and d) LiCoO₂ catalyst at various potentials based on the RRDE data in a) and c).

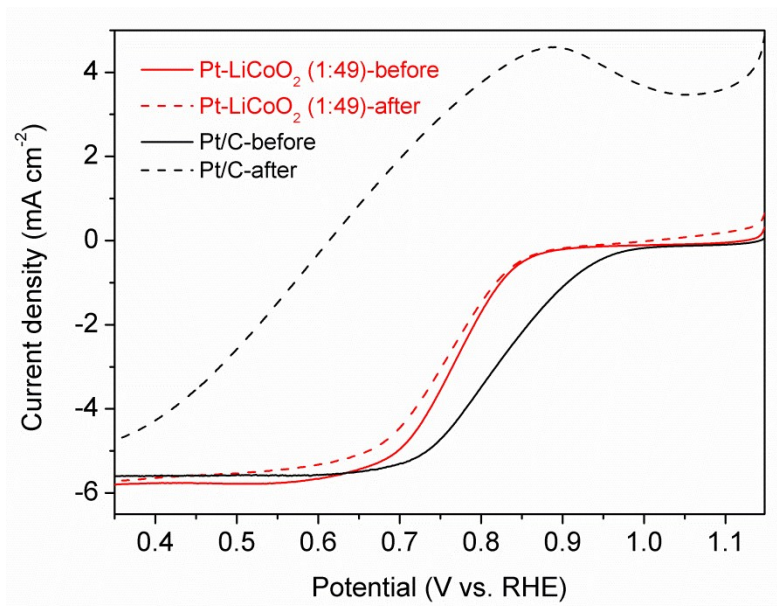


Fig. S6 LSV curves of Pt-LiCoO₂ (1:49) and commercial 20 wt% Pt/C before and after the addition of 0.5 M methanol in O₂-saturated 0.1 M KOH electrolyte at 1600 rpm.

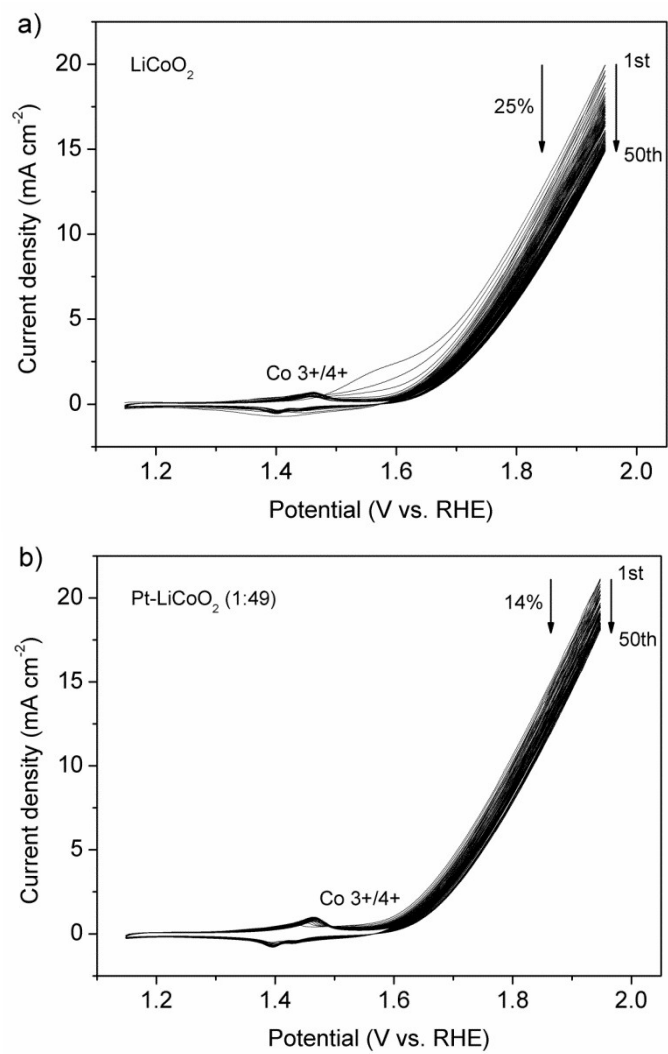


Fig. S7 CVs of a) LiCoO₂ and b) Pt-LiCoO₂ (1:49) catalysts for 50 cycles at a scan rate of 10 mV s⁻¹.