

# Electronic supplementary Information

## Correlation between Platinum nanoparticle surface rearrangement induced by heat treatment and activity for an oxygen reduction reaction †

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ESI1. PES results of each sample.

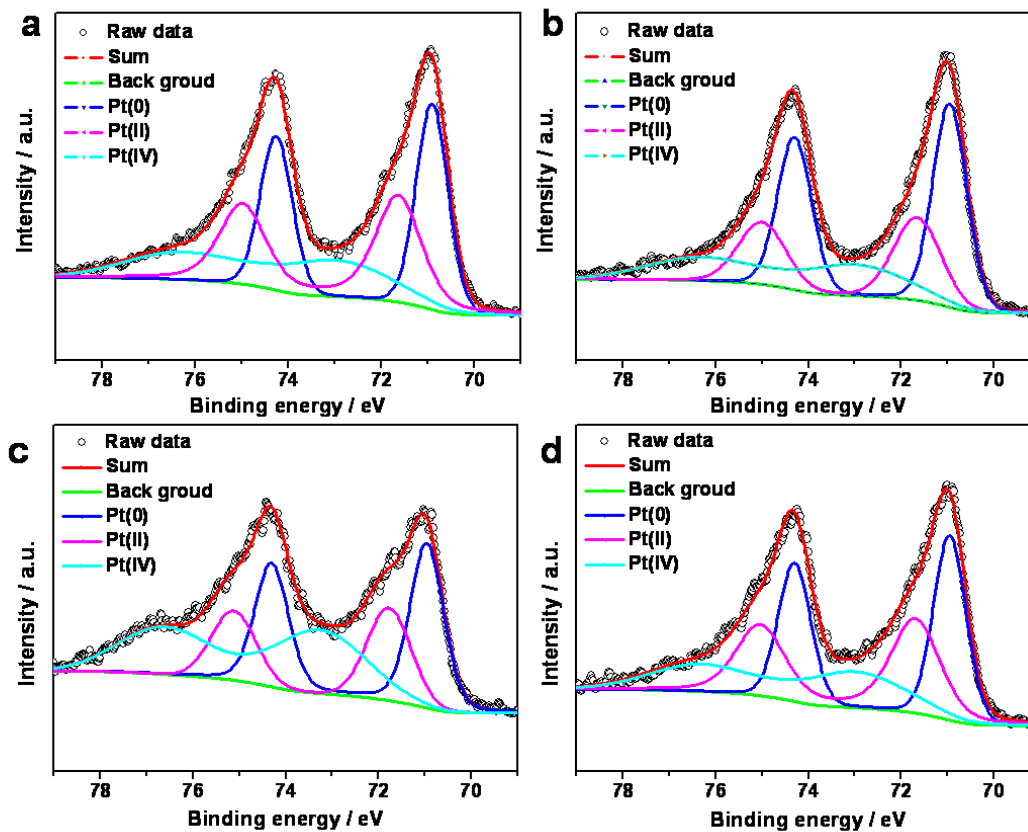
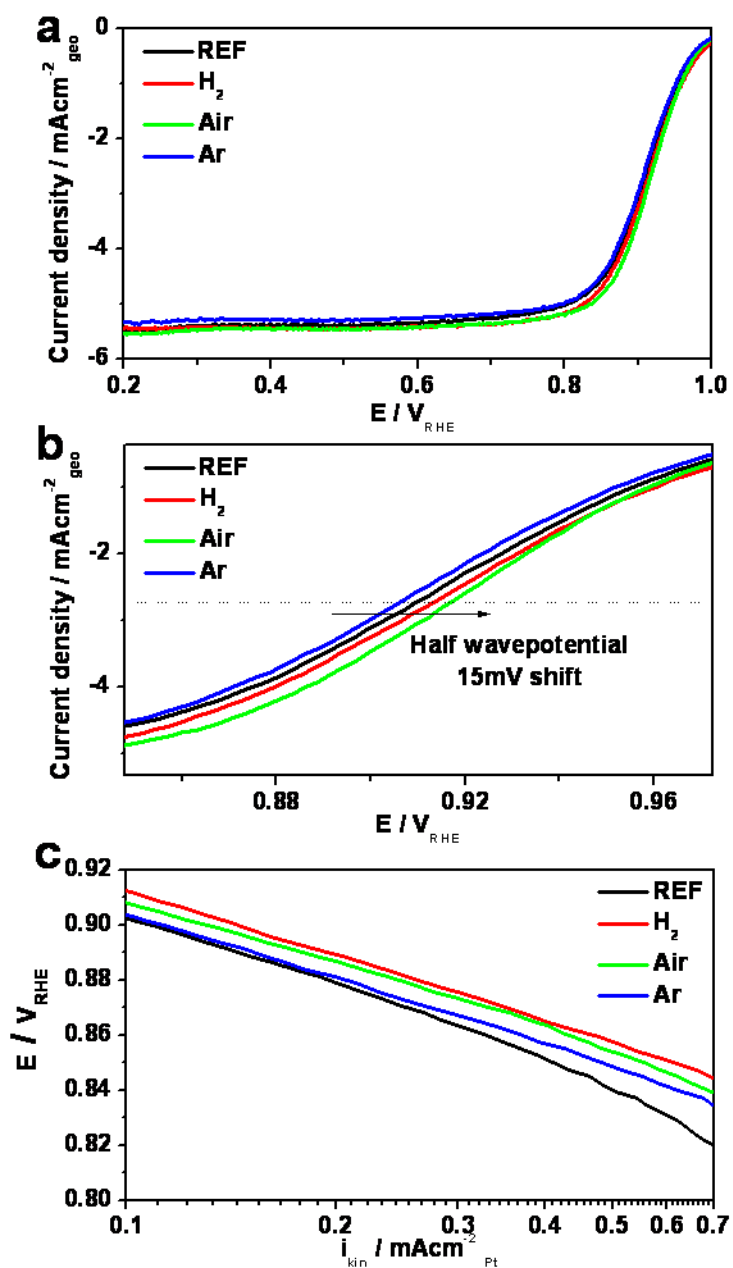


Fig S1. PES measurements of Pt 4f spectra and fitting results for characterizing the Pt chemical state

## ESI2. ORR curves



**Fig S2.** Electrochemical RDE characterization (a) polarization curves for the ORR at 1600 rpm, (b) enlarged curves for comparing half wave potential and (c) specific activity at 1600 rpm and different potential (Tafel Plot)

ESI3. CO<sub>ad</sub> oxidation curve fitting results.

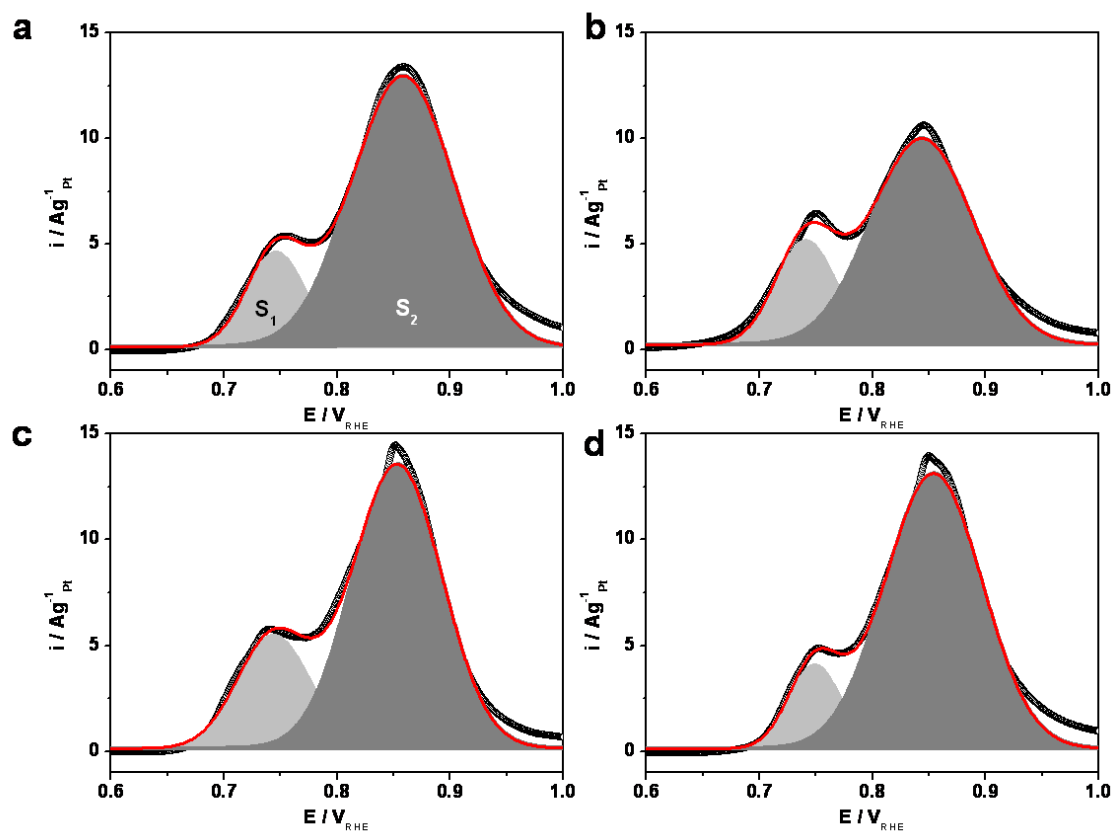
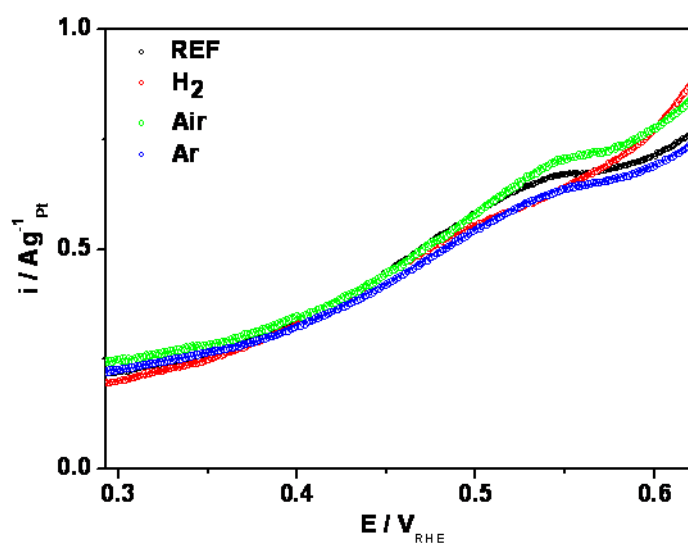


Fig S3. CO<sub>ad</sub> oxidation curve fitting results (a) REF, (b) H<sub>2</sub>, (c) Air, and (d) Ar

**ESI4. Pre-peak of CO<sub>ad</sub> oxidation results to confirm the change of defect site.**



**Fig S4.** Pre-peak of CO<sub>ad</sub> oxidation curve

### ESI5. XANES whitenline absorption intensity and calculation

We compare the whitenline intensity as a calculation based on the theoretical curve. Lorentzian accounts transition to ground state superimposed on an arc tangent function which is transition to continuum states. Integrated area of Lorentzian means the Pt d-band vacancy. The method to fitting the arc tangent and Lorentzian was referred to the previous papers.<sup>1,2</sup>

The whitenline intensity was calculated the integral of fitted Lorentz and as shown in Figure S6.

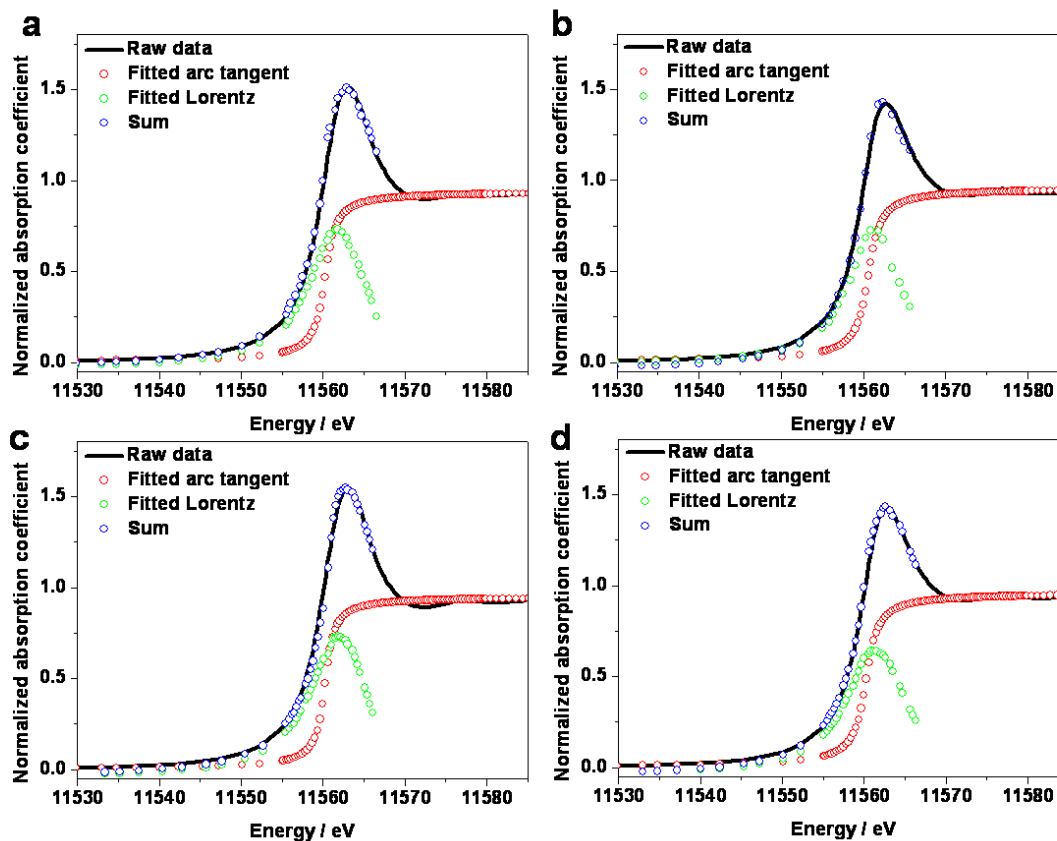


Fig S5. XANES fitting

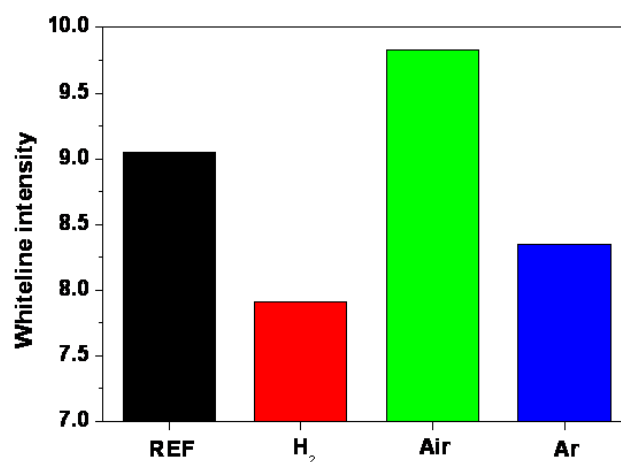


Fig S6. XANES whitenline absorption intensity

1. R. Sousa Jr, F. Colmati, E. G. Ciapina and E. R. Gonzalez, *J. Solid State Electrochem.*, 2007, **11**, 1549-1557.
2. A. K. Shukla, R. K. Raman, N. A. Choudhury, K. R. Priolkar, P. R. Sarode, S. Emura and R. Kumashiro, *J. Electroanal. Chem.*, 2004, **563**, 181-190.