Electronic Supplementary Information

Changes induced by transition metal oxides in Pt nanoparticles unveil the effects of electronic properties on oxygen reduction activity

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Fig. S1 Comparison of X-ray diffraction patterns of Pt/WO$_3$/C (a), Pt/ZrO$_2$/C (b), Pt/TiO$_2$/C (c) and Pt/SnO$_2$/C with those of Pt/C and the corresponding transition metal oxide.
Fig. S2 HR-STEM images obtained in bright and dark field. From top to bottom: Pt/C, Pt/TiO$_2$/C and Pt/SnO$_2$/C.

Fig. S3 Histogram of particle size distribution for Pt/C catalyst.
Fig. S4 Current densities of oxygen reduction and H₂O₂ oxidation measured in 0.5 M H₂SO₄ solution at rotation rates of 1225, 1600, 2025 and 2500 rpm. Currents are presented normalized by the geometric areas of the electrodes (0.247 cm² for disk and 0.187 cm² for ring). RRDE collection efficiency: 0.37.
Fig. S5 Koutecky-Levich plots for Pt/C, Pt/WO<sub>3</sub>/C, Pt/SnO<sub>2</sub>/C and Pt/CeO<sub>2</sub>/C catalysts constructed from disk currents at different potentials. Electrolyte: 0.5 M H<sub>2</sub>SO<sub>4</sub>. The number of electrons was estimated using Co= 1.1 10<sup>-6</sup> g mol cm<sup>-3</sup>, D= 1.4 10<sup>-5</sup> cm<sup>2</sup> s<sup>-1</sup> and v= 1.2 10<sup>-2</sup> cm<sup>2</sup> s<sup>-1</sup>. 
Fig. S6 Tafel plots for Pt/C (a), Pt/TiO$_2$/C (b), Pt/SnO$_2$/C (c) and Pt/WO$_3$/C (d). The lines correspond to –60 mV dec$^{-1}$ and –120 mV dec$^{-1}$. Kinetic current densities obtained by normalization by Pt EAA.

Fig. S7 Normalized in situ XAS spectra for Pt/WO$_3$/C obtained in 0.5 M H$_2$SO$_4$ and regions of maximum intensity enlarged. Applied potential: 0.55 V (black), 0.80 V (red) and 0.90 V (blue).
**Fig. S8** Current densities of oxygen reduction and H₂O₂ oxidation measured in 0.1 M KOH solution at rotation rates of 1225, 1600, 2025 and 2500 rpm. Currents are presented normalized by the geometric areas of the electrodes (0.247 cm² for disk and 0.187 cm² for ring). RRDE collection efficiency: 0.37.
**Fig. S9** Koutecky-Levich plots for Pt/C and Pt/WO$_3$/C catalysts constructed from disk currents at different potentials. Electrolyte: 0.1 M KOH. The number of electrons was estimated using Co= 1.15 $10^{-6}$ g mol cm$^{-3}$, D= 1.9 $10^{-5}$ cm$^2$ s$^{-1}$ and v= 1.9 $10^{-2}$ cm$^2$ s$^{-1}$.

**Fig. S10** ORR polarization curves measured at the disk electrode and H$_2$O$_2$ yield in 0.1 KOH solution Scan rate: 5 mV s$^{-1}$. Rotation rate: 2500 rpm.
**Fig. S11** Number of electrons calculated from RRDE currents measured in 0.1 M KOH solution as a function of potential.

**Fig. S12** Values of the integral of the Lorentzian curve adjusted to the XAS spectra measured *in situ* in 0.1 M KOH with applied potential of 0.90 V.