

Supporting Information

Characterization of Surface Structure and Oxidation/Reduction Behaviour of Pd-Pt/ Al_2O_3 Model Catalysts

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Figure S1 displays the Pd K edge EXAFS spectra after the PdPt samples have been reduced in 2% H₂ (a) or oxidised in 1.5 % O₂ (b). The EXAFS analysis indicates that, during oxidation, the Pd atoms are in an oxidised state similar to PdO, but when they are in a reduced state the PdO phase is reduced to a state which is closer to metallic Pd. No contribution from Pd-metal scattering at oxidising conditions could be observed indicating that Pd is fully oxidised.

Figures S2 and S3 show the evolution of the XAFS spectra for the Pd-Pt F800 and L800 samples at 360 °C during the oxidation-reduction cycling experiment in either 1.5 % O₂ or 2 % H₂. The experiment starts with a 5 min oxidation pulse. The left panel (a) shows XAS spectra recorded at the end of the oxidation and reduction periods, while the right panel shows the recorded XAS spectra as a function of time (b) together with the white line intensity during the experiment (c).

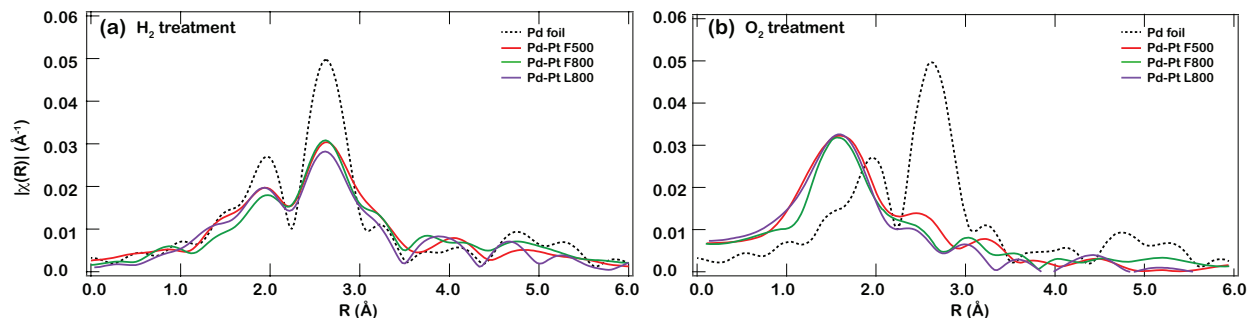


Figure S1: Magnitude of Fourier Transformed Pd K edge EXAFS spectra recorded *in situ* from the reduced (a) and oxidized (b) Pd-Pt/Al₂O₃ catalysts at 360 °C (k-weight = 0). Pd foil is included as a reference. The spectra are taken during the transient oxidation/reduction measurement as shown in Figure 6 with a time resolution of 0.5 sec, therefore the poor data quality.

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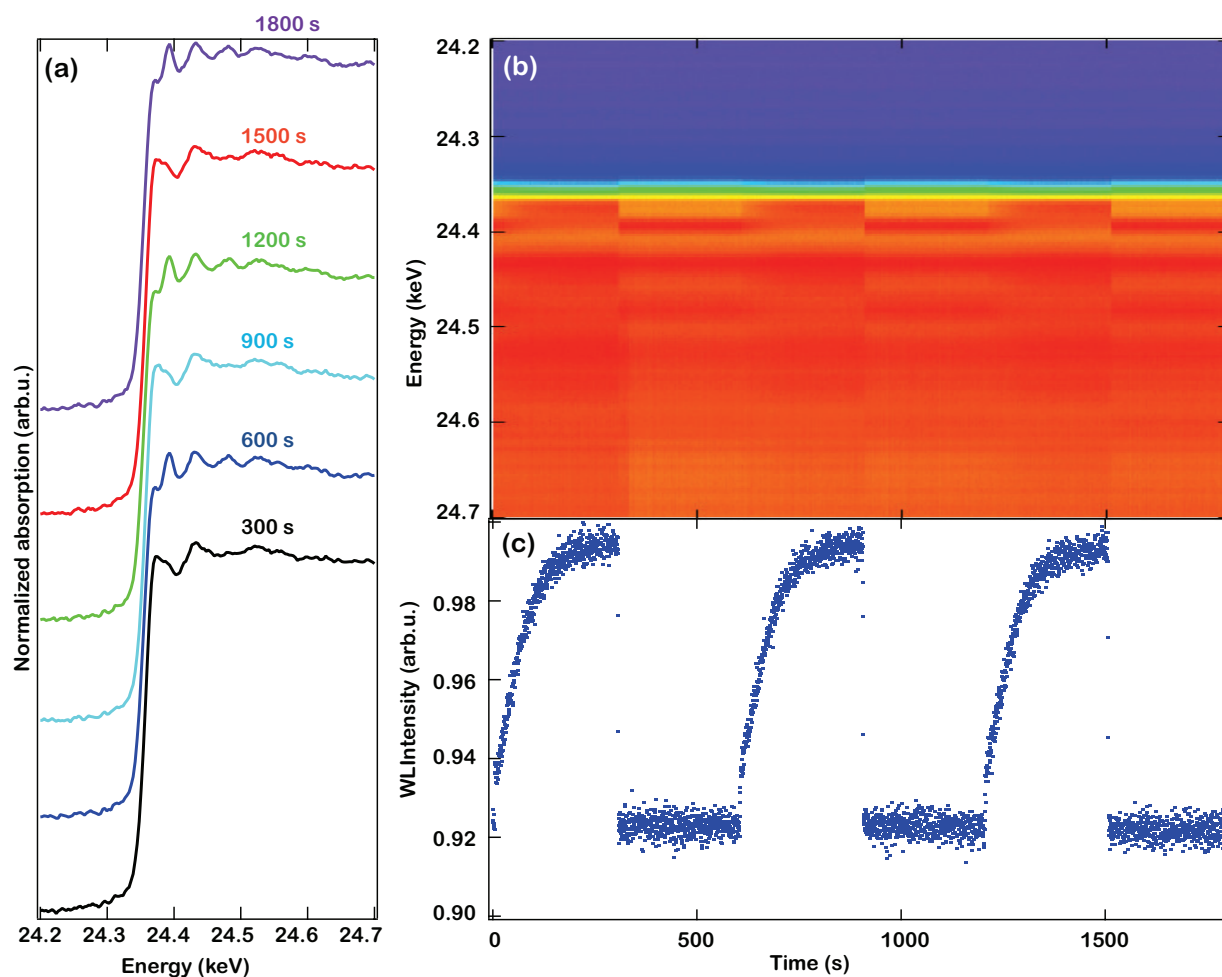


Figure S2: XAS spectra recorded during consecutive 300 s oxidising (1.5 % O₂) and reducing (2 % H₂) periods over Pd-Pt/Al₂O₃ F800 at 360 °C. (a) XAS spectra recorded at the end of the oxidising and reducing periods. (b) Colour coded intensities of XAS spectra (blue:low intensity, red:high intensity) and (c) the XAS white line intensity at 24 372 eV.

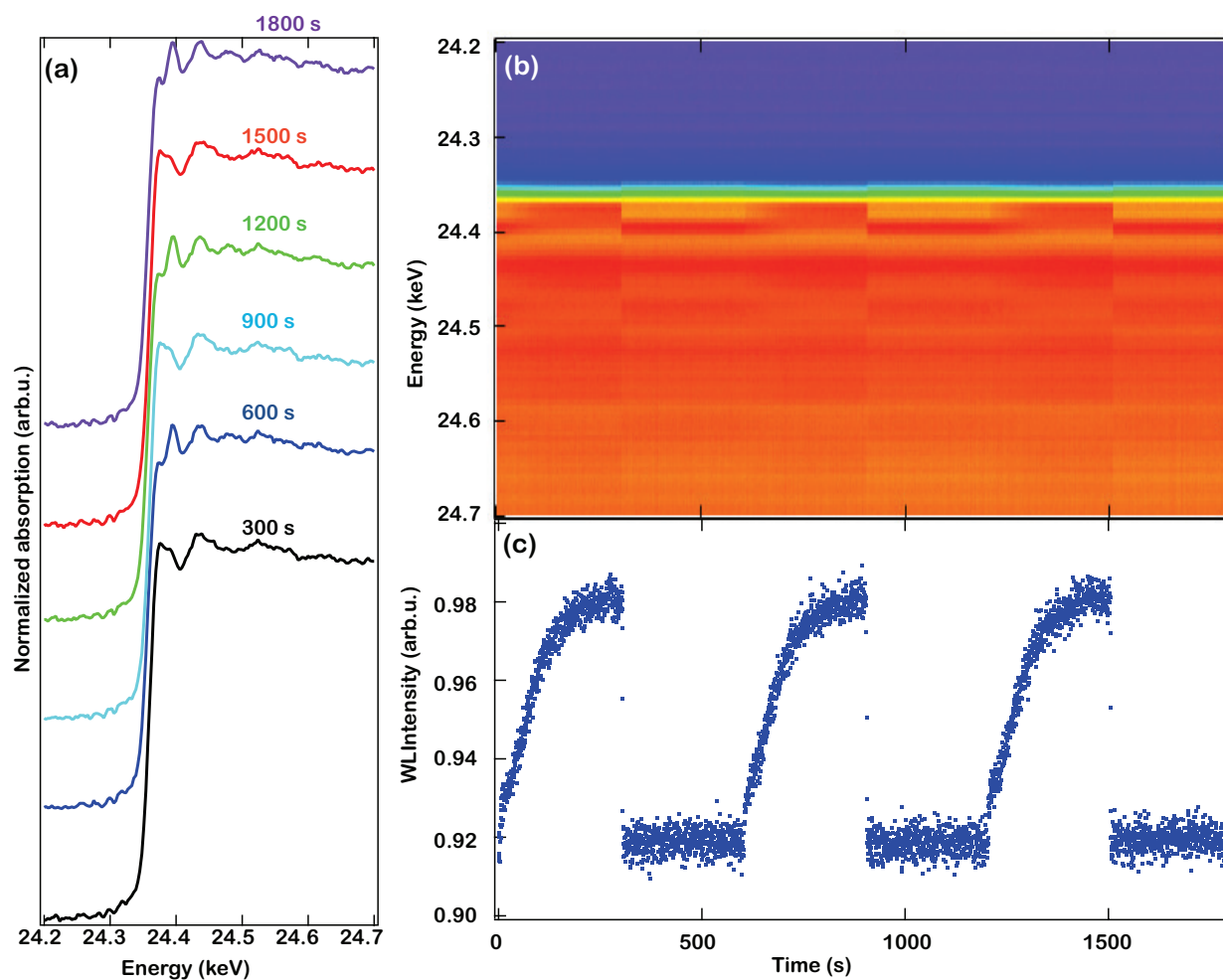


Figure S3: XAS spectra recorded during consecutive 300 s oxidising (1.5 % O_2) and reducing (2 % H_2) periods over Pd-Pt/ Al_2O_3 L800 at 360 °C. (a) XAS spectra recorded at the end of the oxidising and reducing periods. (b) Colour coded intensities of XAS spectra (blue:low intensity, red:high intensity) and (c) the XAS white line intensity at 24 372 eV.