

Supporting information for:

Chemistry of supported palladium nanoparticles during methane oxidation

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EXAFS analysis details

The normalized XAFS spectra for Pd/Al₂O₃ from the same data as used in the EXAFS analysis are shown in Figures S1 and S2. For comparison normalized XAFS spectra from Pd/CeO₂ at 350 °C are shown in Figure S3. In the EXAFS fitting procedure the energy shift ΔE_0 , amplitude reduction factor S_0^2 , path distance R , and mean-square relative displacement σ^2 , were used as free-floating parameters. Where multiple scatterings paths were used ΔE_0 and S_0^2 were constrained to the same value for all paths. The best-fit results and $\mathcal{R}$ factor for each fit are given in table S1.

Table S1: Best-fit parameters and $\mathcal{R}$ factors for EXAFS fits

	Pd/Al ₂ O ₃ 350 °C		Pd/Al ₂ O ₃ 300 °C	
	Pd-Pd (rich period)	Pd-O (lean period)	Pd-Pd	Pd-O
ΔE_0	-6(2)	2(2)	-4(3)	
S_0^2	0.7(2)	0.56(9)	0.6(1)	
R	2.70(1)	2.02(1)	2.71(2)	2.00(2)
σ^2	0.017(2)	0.001(1)	0.009(2)	0.007(3)
$\mathcal{R}$ factor	0.032	0.0032	0.015	

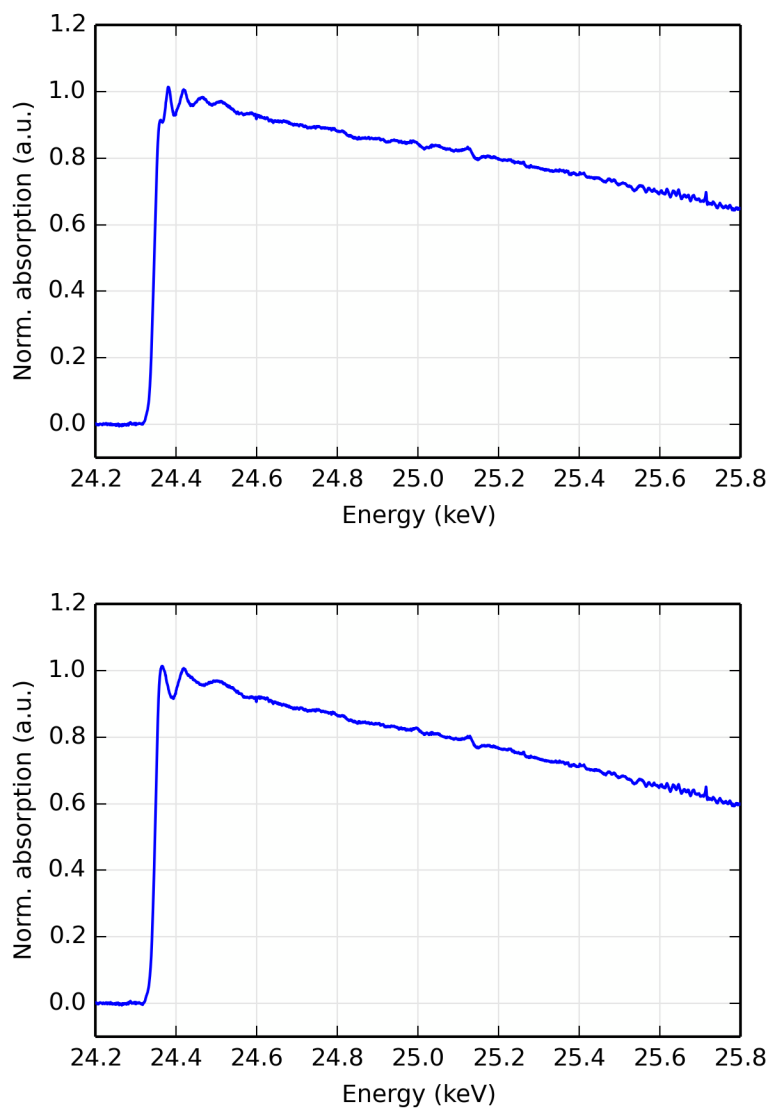


Figure S1: Normalized XAFS spectra from Pd/Al₂O₃ at 350 °C produced by averaging 40 ED-XAS scans. (top) Spectrum recorded at the end of a rich period (1182–1190 s), and (bottom) spectrum recorded at the end of a lean period (882–890 s).

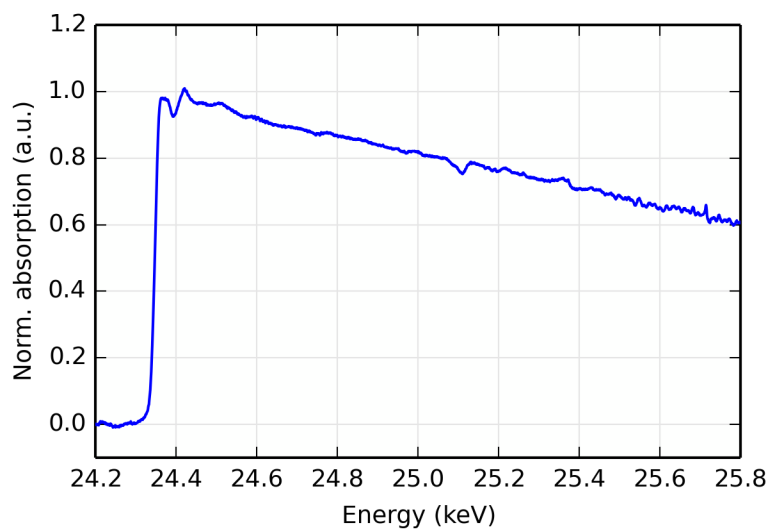


Figure S2: Normalized XAFS spectrum from Pd/Al₂O₃ at 300 °C produced by averaging 40 ED-XAS scans at the end of a lean period (882–890 s).

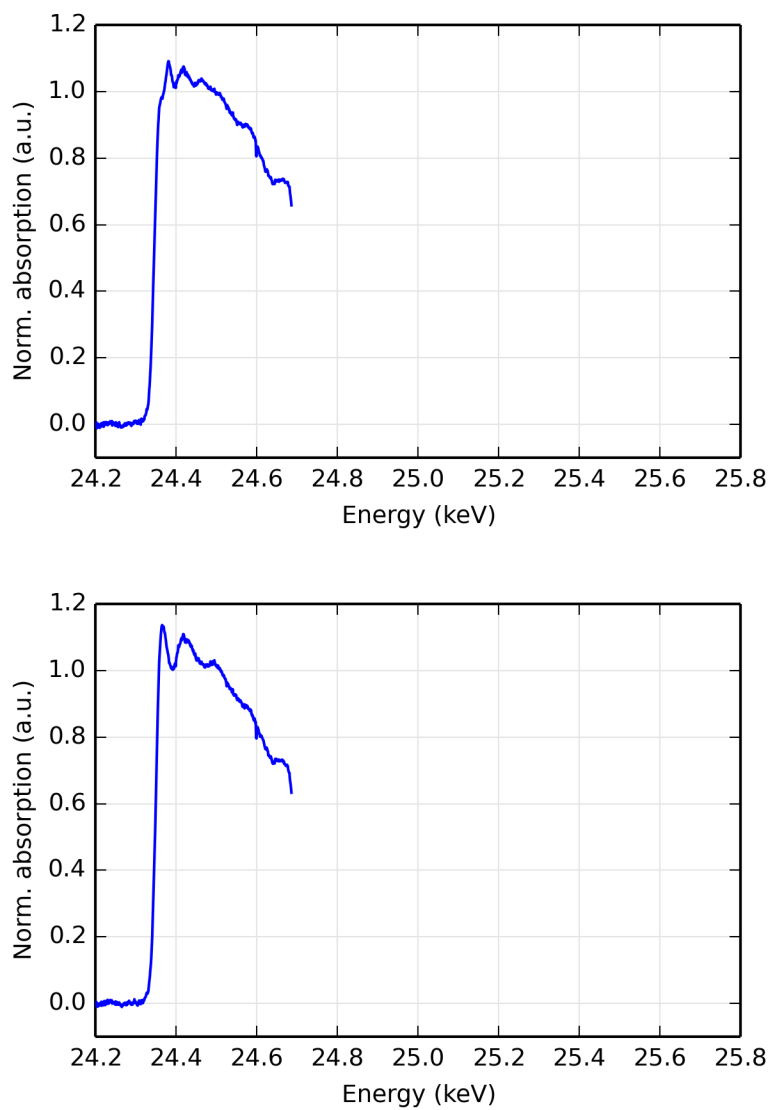


Figure S3: Normalized XAFS spectra from Pd/CeO₂ at 350 °C produced by averaging 8 ED-XAS scans. (top) Spectrum recorded at the end of a rich period (1182–1190 s), and (bottom) spectrum recorded at the end of a lean period (882–890 s).