Supporting Information

Controlling Nanoscale Properties of Supported Platinum Catalysts through Atomic Layer Deposition

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Additional TEM Information

Magnifications used for HRTEM images in Figure 1 were A) 300kx and D) 400kx. Magnification used in Figure 2 were both 320kx. The number of particles measured for statistics were n= 167 for 1 Pt ALD cycle with O_2, n=148 for 1 Pt ALD cycle with H_2, n=134 for 5 Pt ALD cycles with O_2, and n= 236 for 5 Pt ALD cycles with H_2.

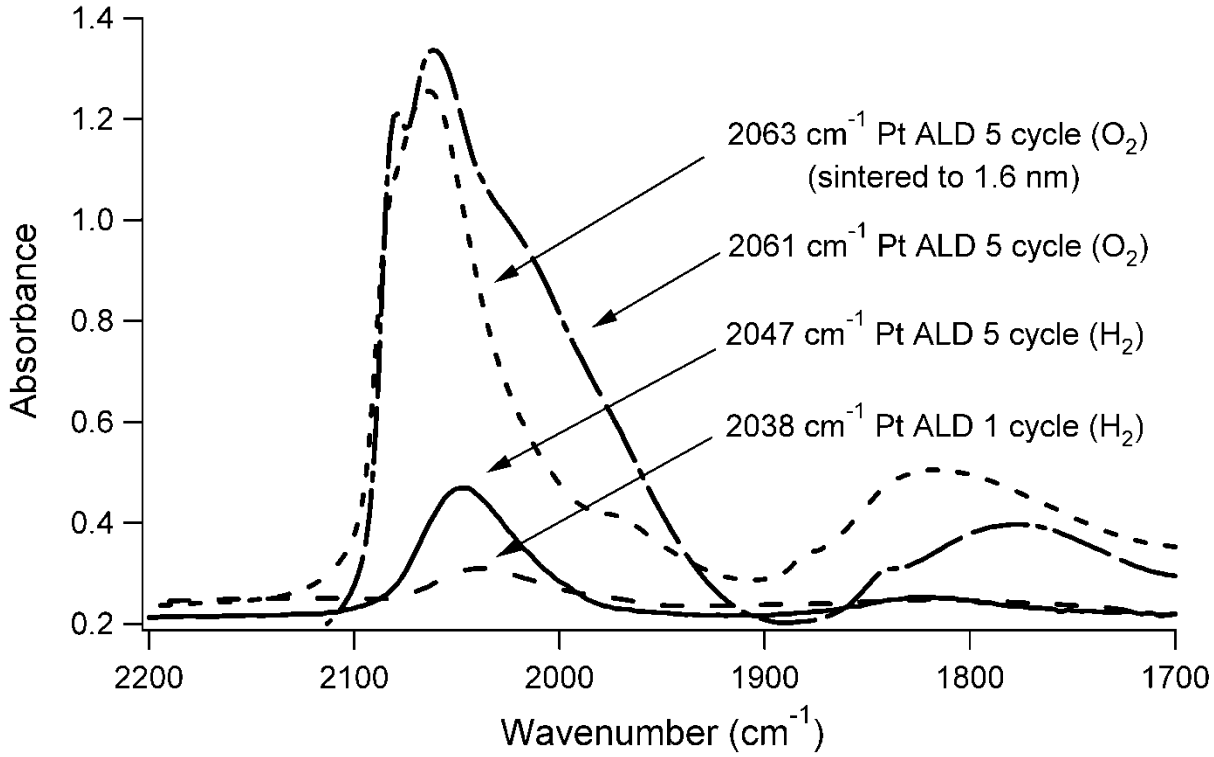

Figure S1. Absorbance from CO DRIFTS experiments after CO saturation (~ 180 kPa) for the different Pt/Al_2O_3 catalysts. Peak locations for single-atom linearly-adsorbed CO stretching are noted.

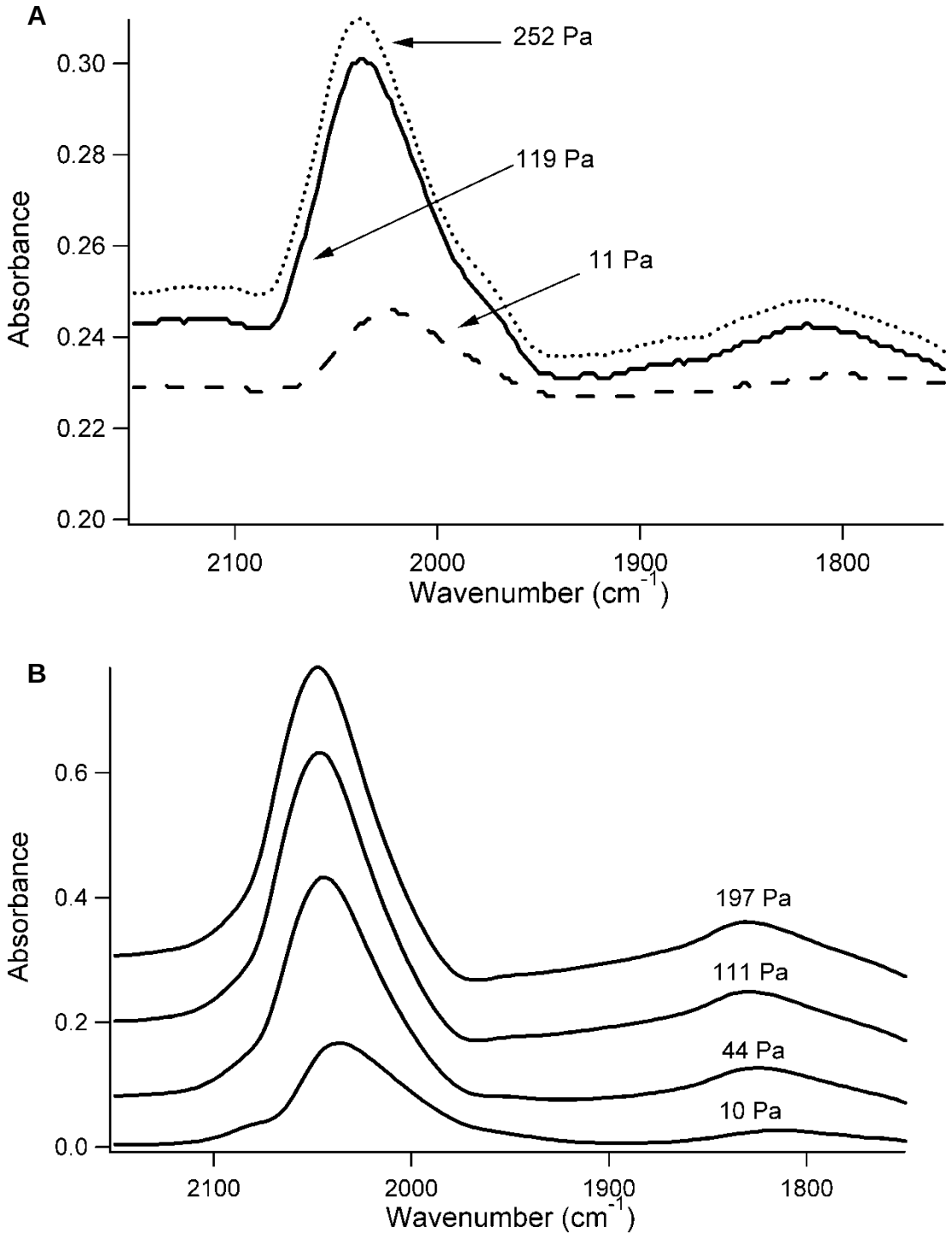

Figure S2. CO DRIFTS spectra for catalyst at varying CO pressures (shown on right): A) 1 cycle Pt ALD (with H_2), B) 5 cycles Pt ALD (with H_2)

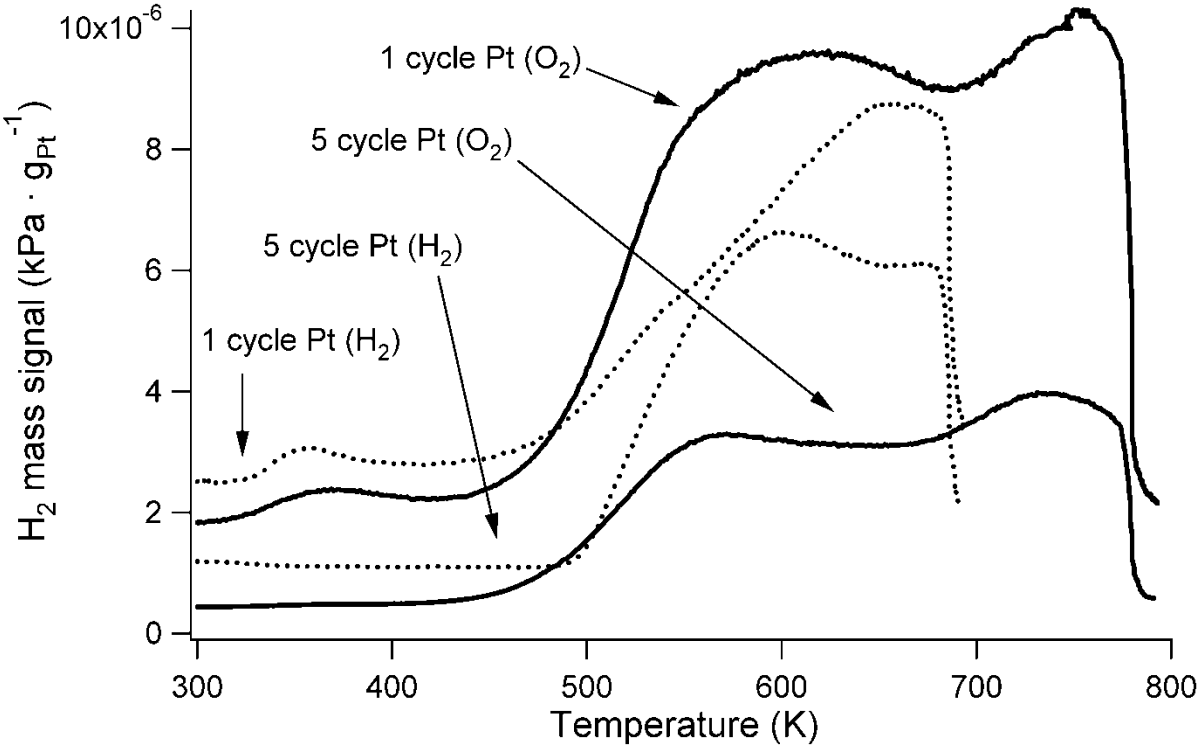

Figure S3. Hydrogen produced during CO TPD for the ALD catalysts, coinciding with CO_2 desorption. The signal shown above is the raw H_2 signal normalized per g_{Pt}, but the H_2 signal was not calibrated.

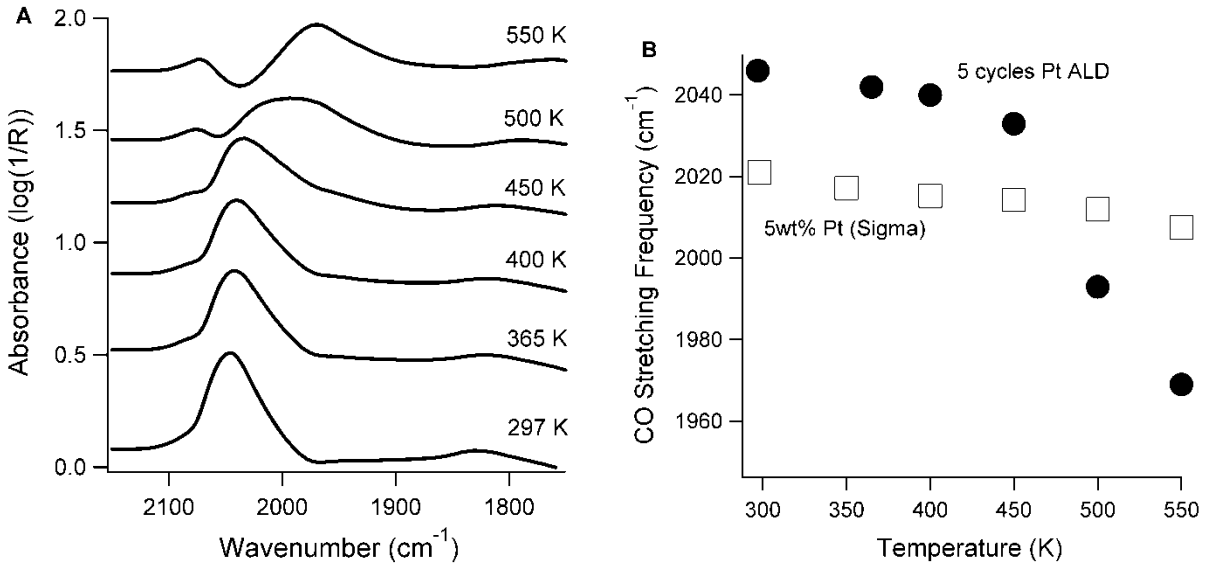

Figure S4. A) CO DRIFTS spectra for the 5-cycle H_2 ALD catalyst as a function of temperature, B) CO stretching frequency peak position as a function of temperature for the 5-cycle H_2 ALD catalyst and commercial 5 wt% Pt catalyst.

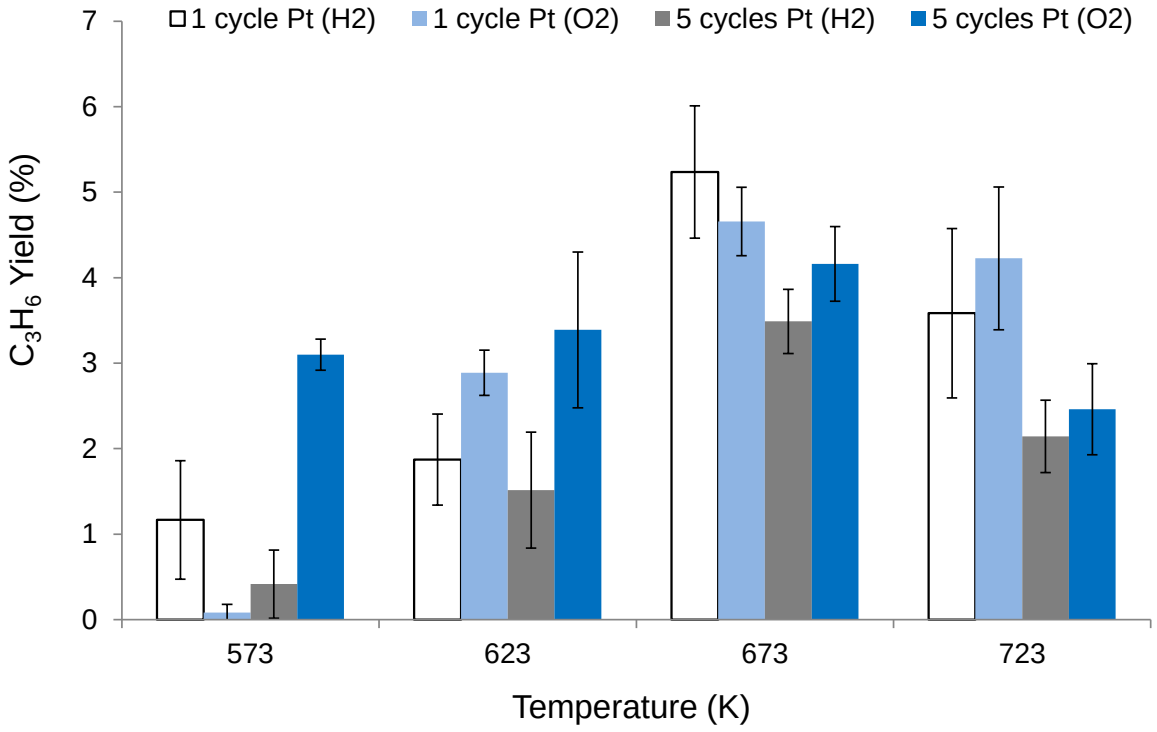

Figure S5. Yield of C_3H_6 during ODHP on the Pt ALD catalysts in O_2-lean reaction conditions.

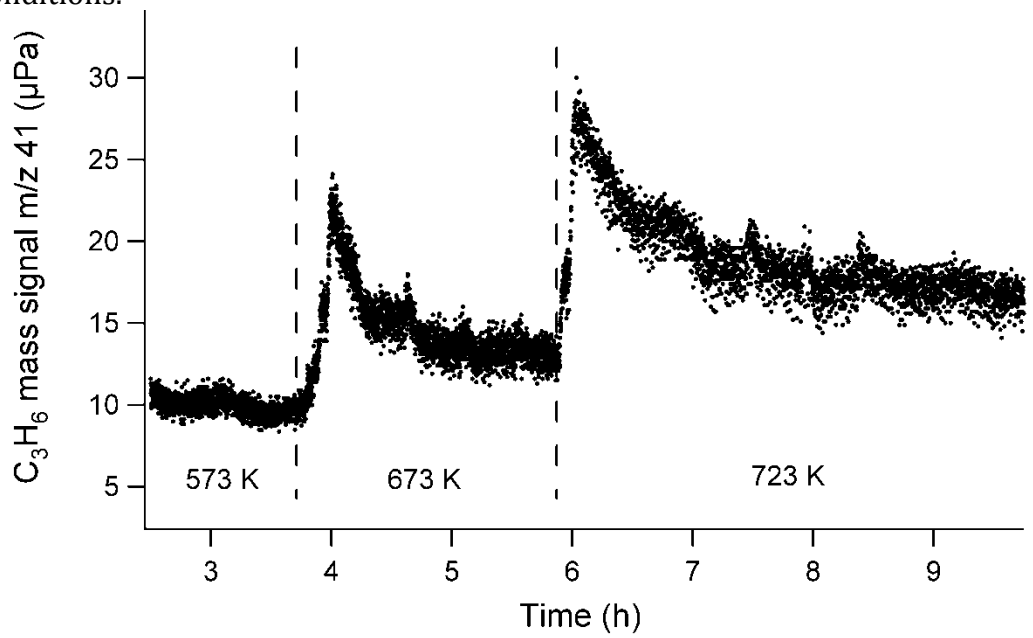

Figure S6. ODHP reaction rate (uncalibrated) vs. time for three temperatures on the Pt ALD 5-cycle (with H_2) catalyst.

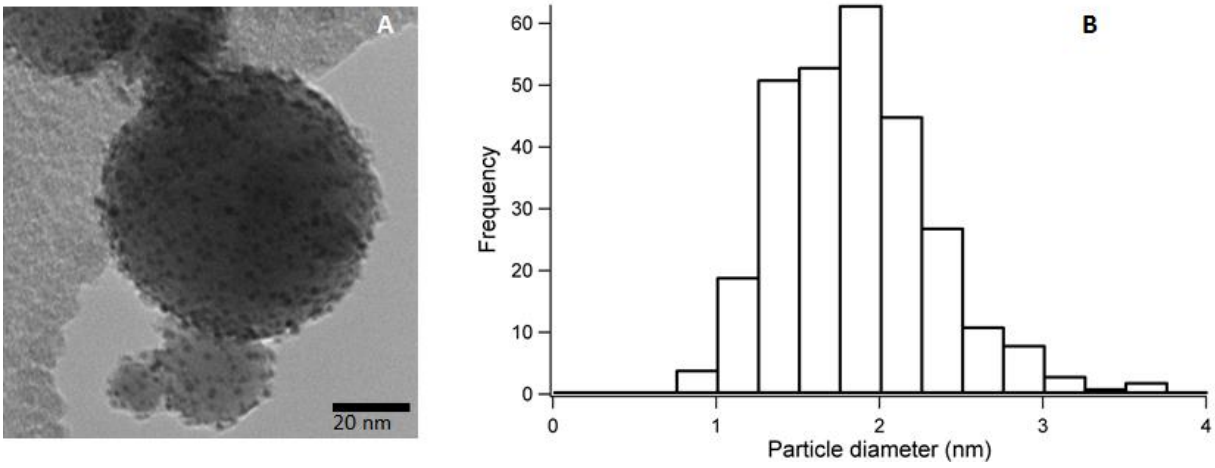

Figure S7. TEM analysis of sample prepared by 5 ALD cycles with H_2 as the second precursor following exposure to reaction conditions (ramping temperature from 350-500°C) over two hours; A: sample TEM image, B: histogram of particle sizes.