Supplementary Materials: "Intelligent" Pt Catalysts Based on Thin $LaCoO_3$ Films Prepared by Atomic Layer Deposition

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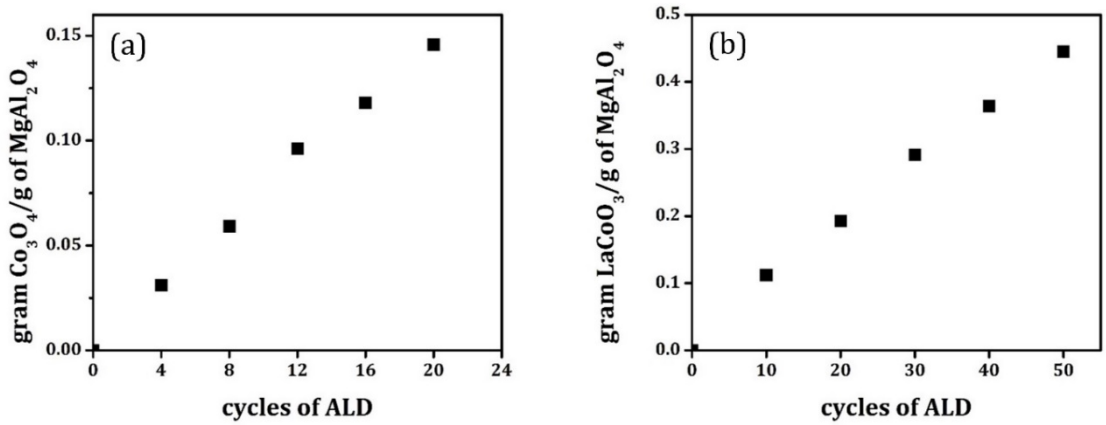

Figure S1. The mass gain of (**a**) Co_3O_4 and (**b**) $LaCoO_3$ on $MgAl_2O_4$ as a function of ALD cycles.

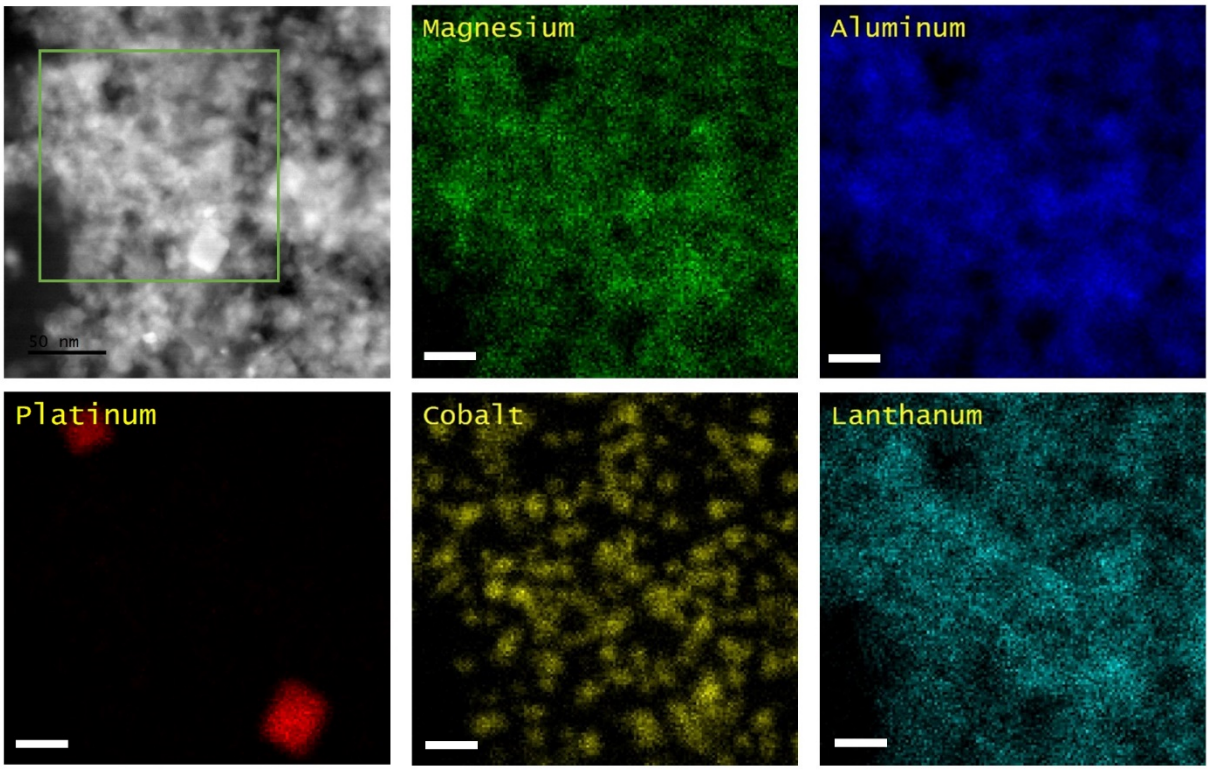

Figure S2. High angle annular dark field STEM image and EDS maps of Mg, Al, La, Co and Pt on reduced Pt/LCO/MAO after 5 redox cycles, taken from the region indicated by the green box. The scale bars represent 20 nm.

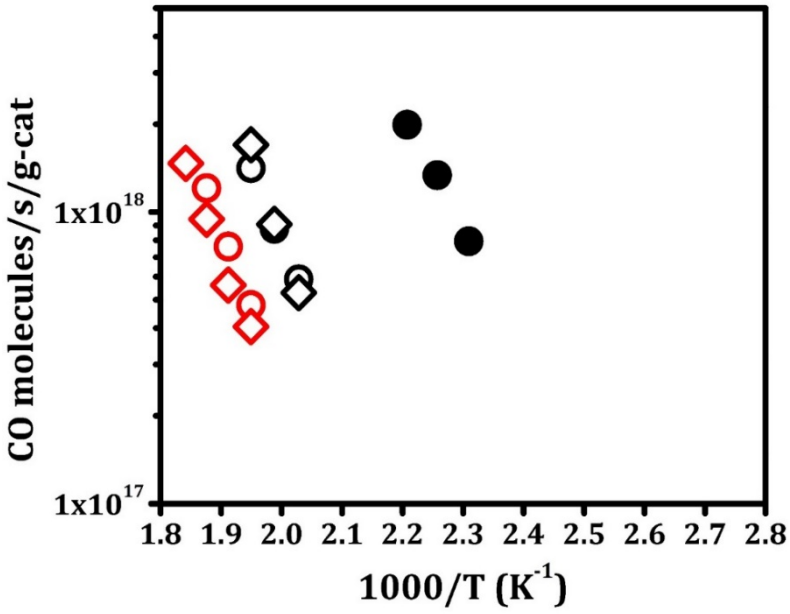

Figure S3. Steady-state, differential reaction rates for CO oxidation with 25 Torr of CO and 12.5 Torr O_2 for 0.1 g sample of Pt/MAO. Rates measured on sample that after oxidation in 10% O_2-He at 1073 K for 1 h are marked in circles; rates measured on samples that after reduction in 10% H_2-He at 1073 K for 1 h are marked in diamonds. Black symbols denote the first redox cycle, while red symbols show data after the fifth cycle.

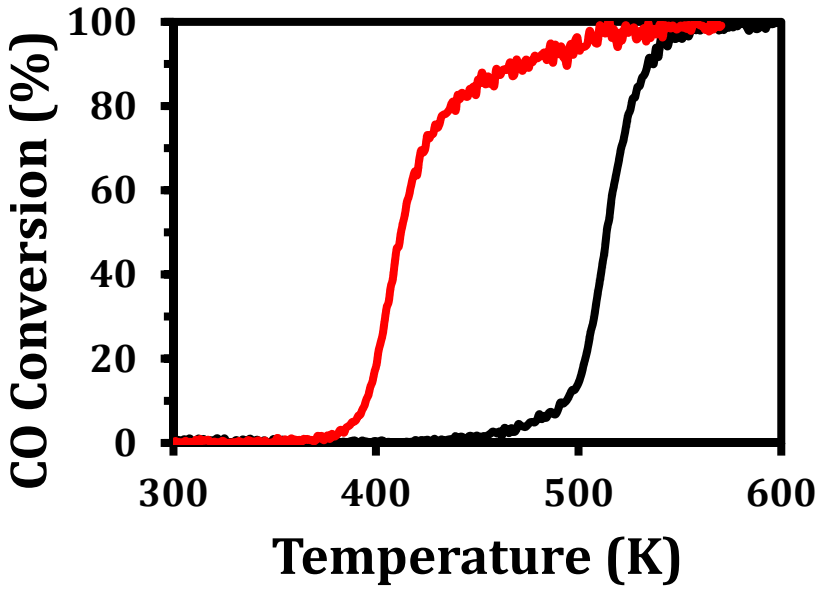

Figure S4. Light-off curves for CO oxidation over 0.1 g samples of oxidized (black) and reduced (red) Pt/LCO/MAO after 5 redox cycles.

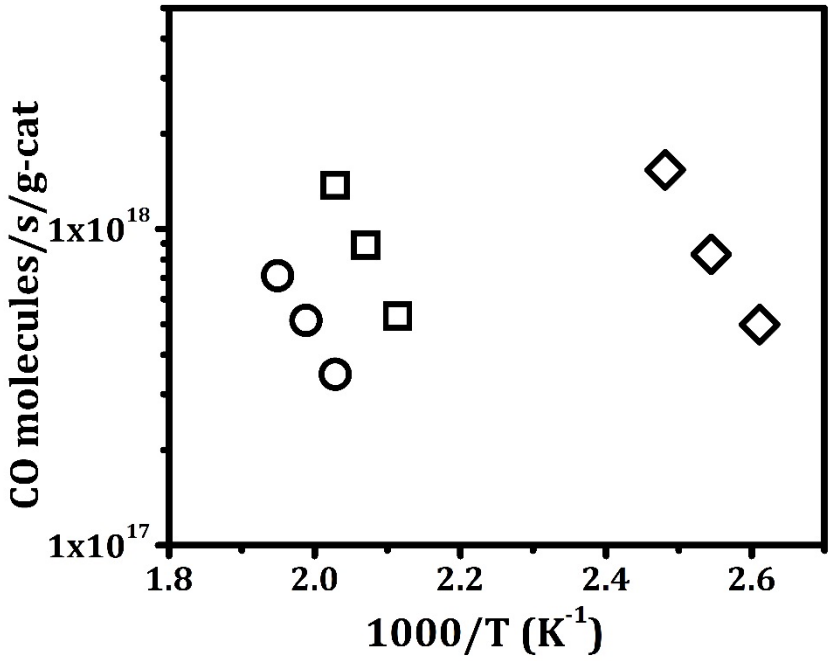

Figure S5. Steady-state, differential reaction rates for CO oxidation with 25 Torr of CO and 12.5 Torr O_2 for 0.1 g sample of Pt/LCO/MAO. Rates measured on sample that after oxidation in 10% O_2-He at 1073 K for 1 h are marked in circles; rates measured on sample that after reduction in 10% H_2-He at 1073 K for 1 h are marked in diamonds; rates measured on sample that after reduction in 10% H_2-He at 773 K for 1 h are marked in diamonds.

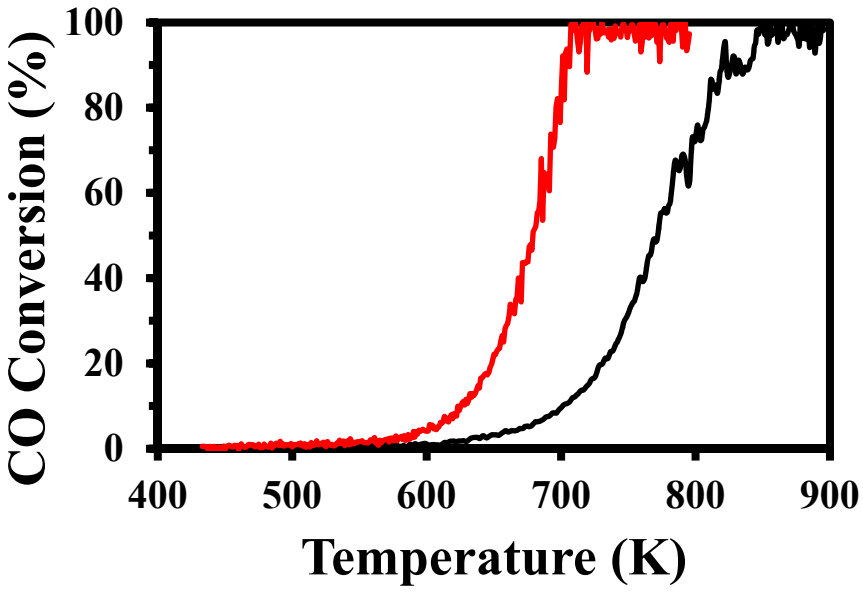

Figure S6. Light-off curves for WGS over 0.1 g samples of oxidized (black) and reduced (red) Pt/LCO/MAO after 5 redox cycles.

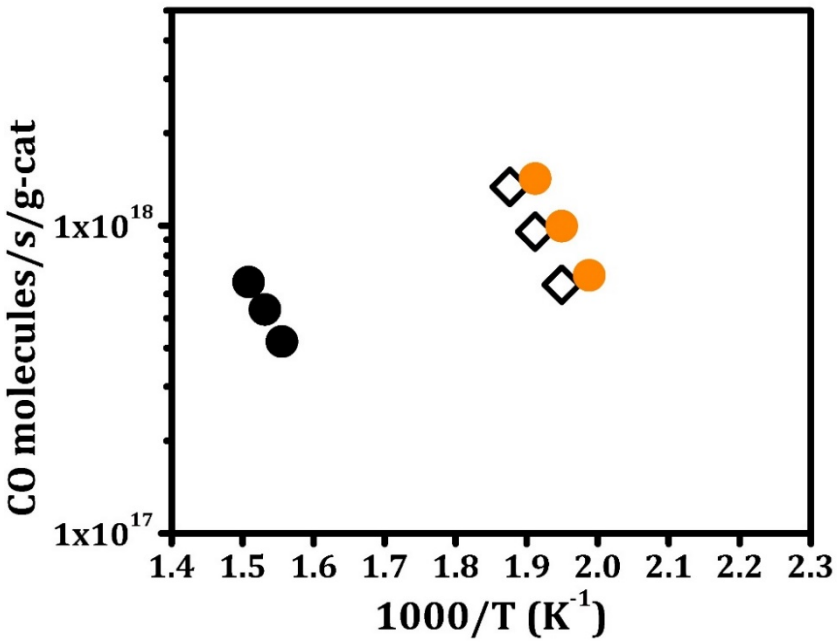

Figure S7. Steady-state, differential reaction rates over 0.1 g samples of (orange circles) 1073 K-calcined Pt/CeO_2/γ-Al_2O_3, (black circles) 1073 K-calcined Pt/γ-Al_2O_3, and (diamond) reduced Pt/LCO/MAO after 5 redox cycles for Water-Gas-Shift with partial pressures of CO and H_2O both kept at 25 torr.

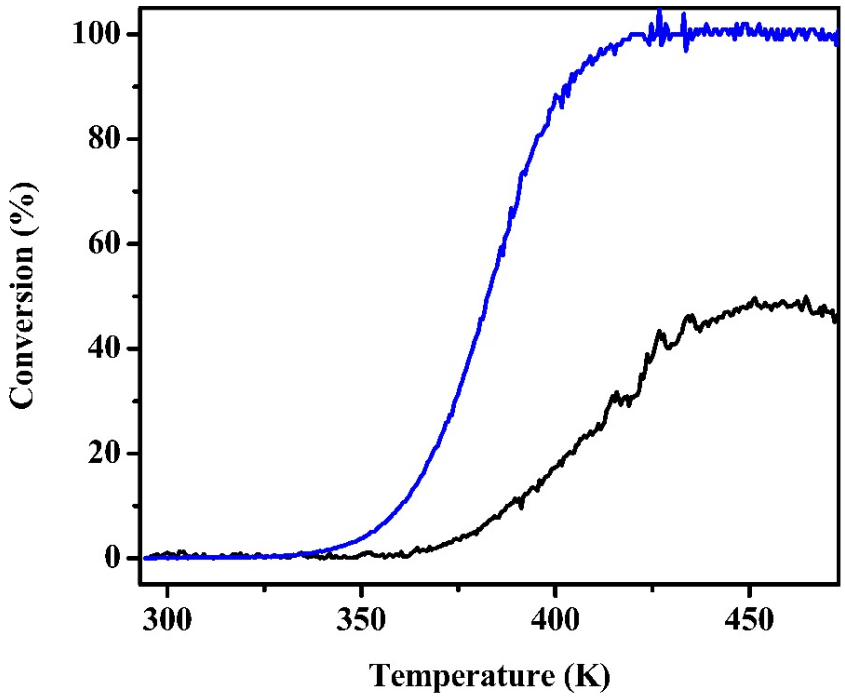

Figure S8. Light-off profiles for toluene hydrogenation for 0.1 g samples of (blue) reduced Pt/Co/MAO, and (black) reduced Pt/LCO/MAO**.** Samples have been pretreated with 5 redox cycles prior to measurements.