

Supplemental Information for Stamm Masias et al

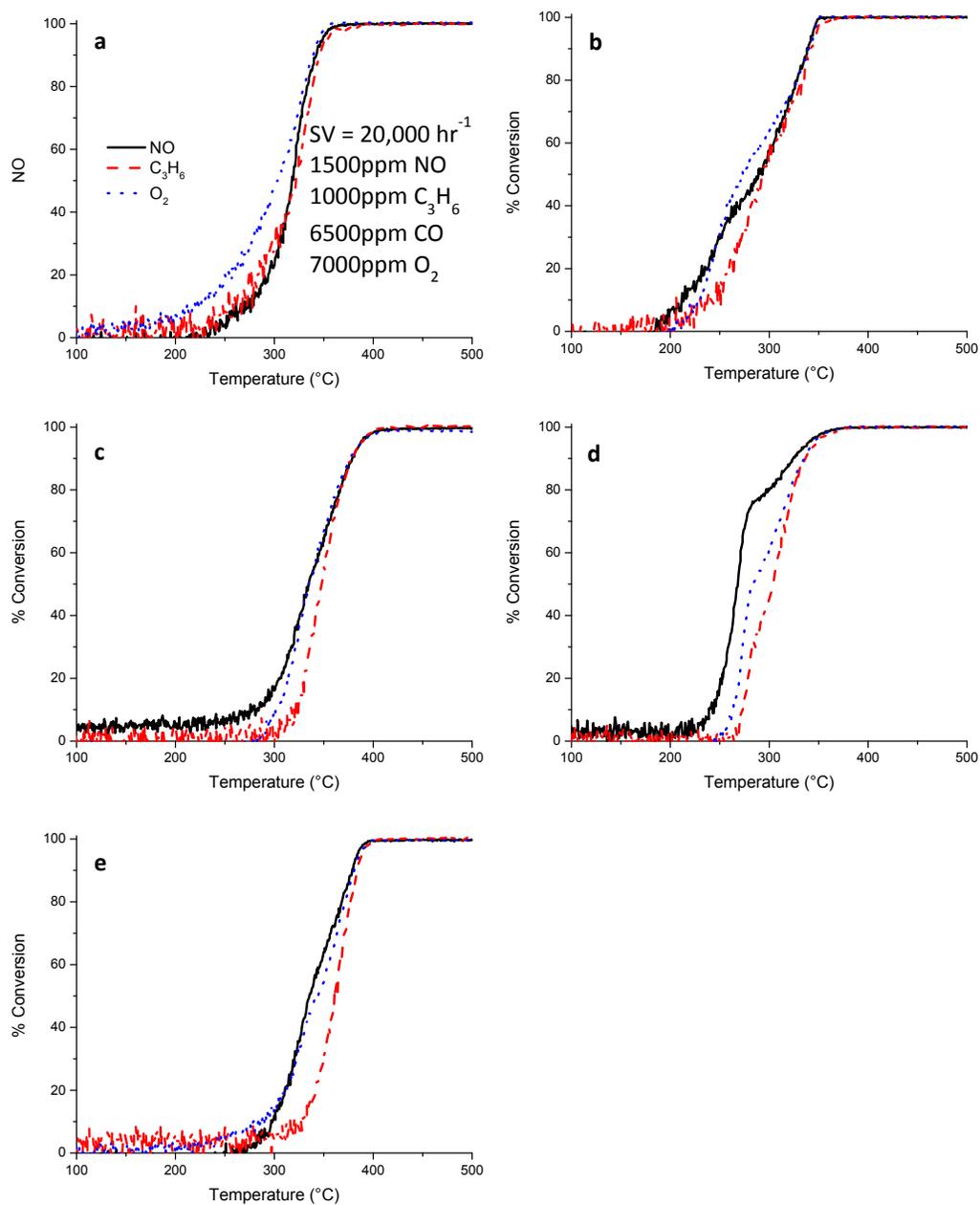


Figure S1. Temperature vs. conversion plots of Pt/alumina (a) and Rh/Zirconia (b) exhibit conversion of hydrocarbon prior to reaction of NO, whereas Pd doped BaCeO<sub>3</sub> (c) Rh doped BaCeO<sub>3</sub> (d) and Ir doped BaCeO<sub>3</sub> (e) first react NO while the hydrocarbon reaction is delayed. It should be noted that the conversion of CO during these experiments can also be inferred, but quantification of the CO is difficult due to the mass overlap with N<sub>2</sub>

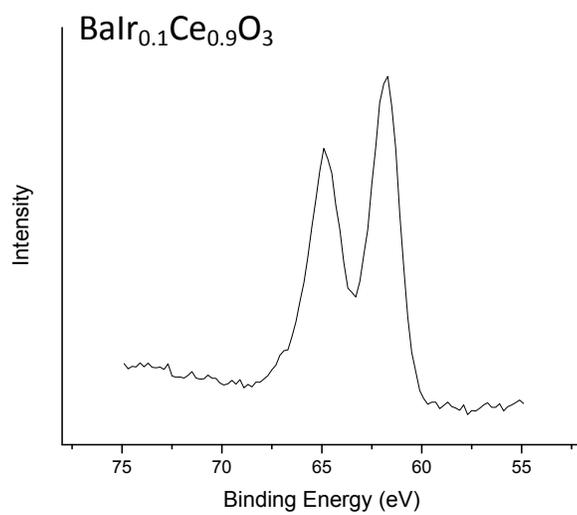
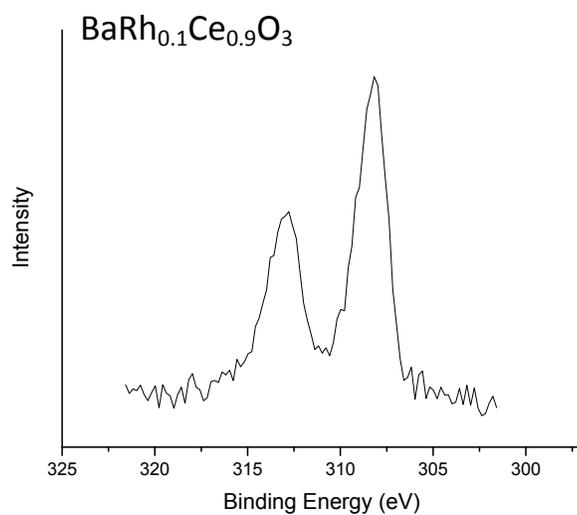
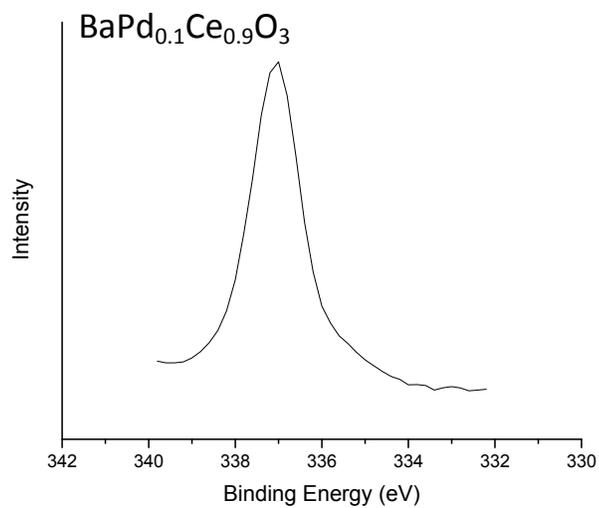


Figure S2. Pd 3d, Ir 4f and Rh 3d photoelectron spectra of the doped barium cerates obtained on a PHI Versaprobe employing an Al source and a pass energy of 23.5 eV. An internal standard was employed; all spectra were normalized to the silica 2p peak.

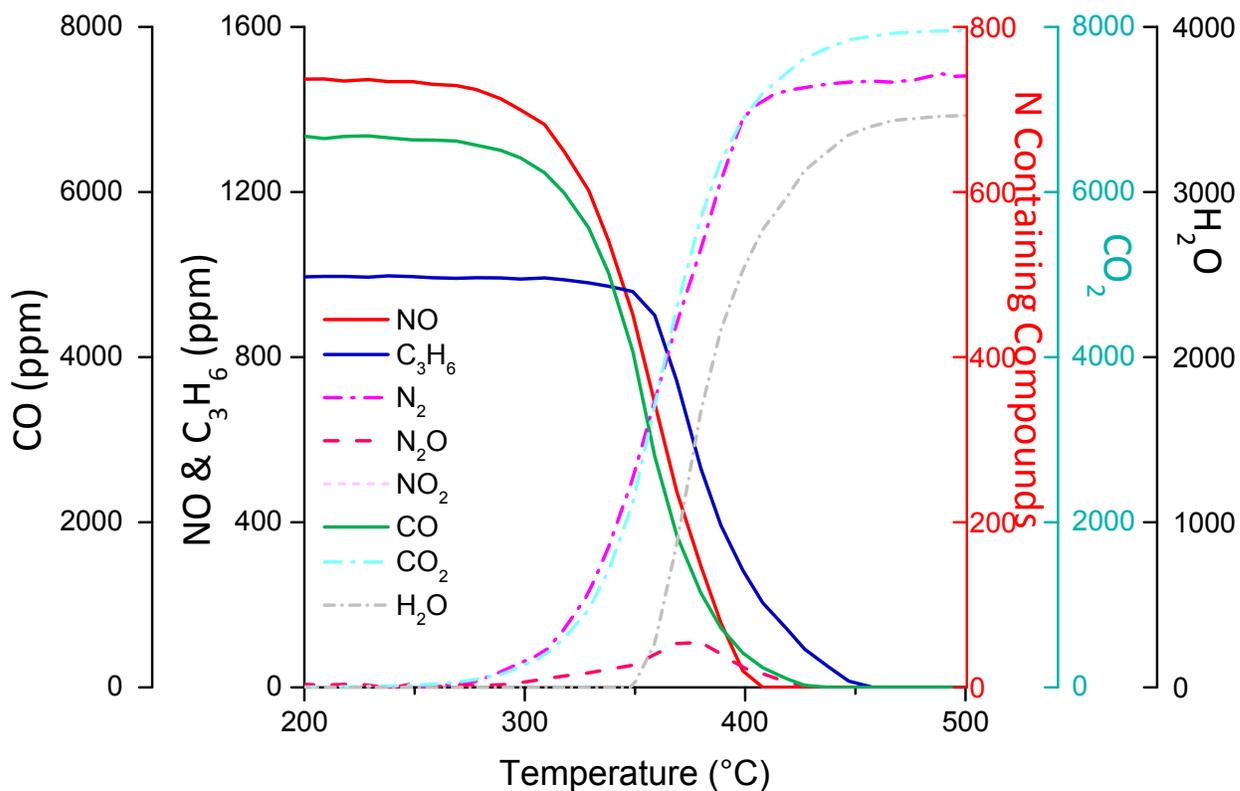


Figure S3. Concentration of reactant NO, CO, and CO<sub>2</sub> (measured via FTIR; left axis, solid lines) and reactants (N<sub>2</sub>O, NO<sub>2</sub>, NH<sub>4</sub>, CO<sub>2</sub>, and H<sub>2</sub>O measured by FTIR, N<sub>2</sub> calculated by mass balance; right axes, dotted lines) for a stoichiometric reaction at dynamic temperature conditions over a Ir doped BaCeO<sub>3</sub> catalyst

### Calculation of Active Site Density

The active site density for TOF calculations has been estimated by making several assumptions which may overestimate the number of sites, similar to the referenced paper X. Ouyang and S. L. Scott, *J. Catal*, 2010, **273**, 83-91. These assumptions include the crystallographic unit cell matching the referenced crystal structure. It is also assumed that the precious metal substitutes exclusively on the B site.

To calculate the Pd content in  $\text{BaPd}_{0.1}\text{Ce}_{0.9}\text{O}_3$ , the surface area of the face of a unit cell is calculated from the cell dimensions,  $a$  and  $b$ , converting  $\text{\AA}^2$  to  $\text{m}^2$ . This is then divided by the experimentally measured surface area ( $\text{m}^2/\text{g}$ ) to yield the total number of surface exposed unit cells (unit cells/g). As each unit cell contains 4 B sites at 10% doping the number of Pd per unit cell would be 0.4 Pd sites/unit cell. Scaling the exposed surface of unit cell to the number of sites,  $0.4\text{Pd sites/unit cell} \times \text{unit cells/g}$ , the Pd sites/g of sample can be calculated.

$$\frac{ab \times 10^{-20} \left( \frac{\text{m}^2}{\text{unit cell}} \right)}{\text{BET Surface Area} \left( \frac{\text{m}^2}{\text{g}} \right)} * \text{Substituted B Sites} = \frac{\text{number of active sites}}{\text{gram of sample}}$$

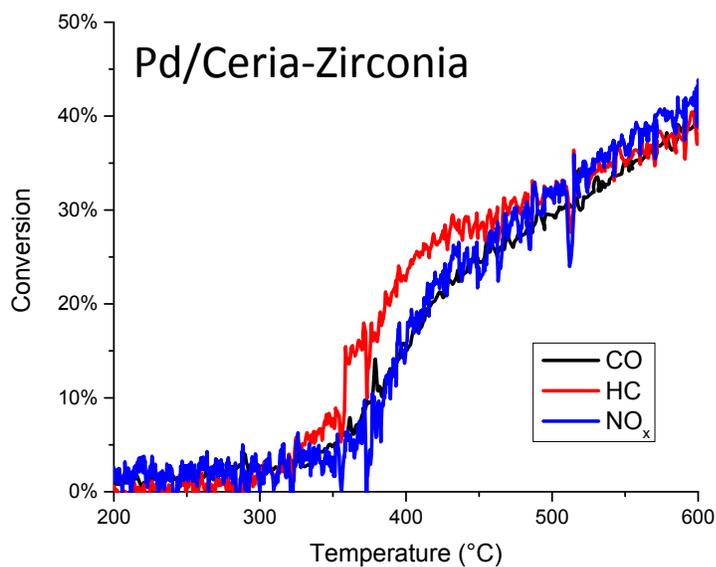
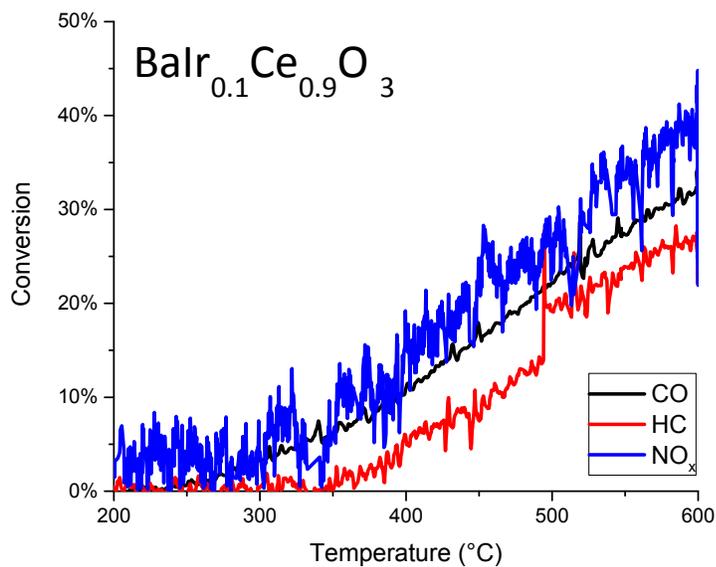


Figure S4. Conversion as a function of temperature as measured on a Horiba CCATS reactor employing an integrated MEXA 7100D detector. 1 gram of either  $\text{BaIr}_{0.1}\text{Ce}_{0.9}\text{O}_3$  or 0.5wt % Pd on a ceria-zirconia support was exposed to 30mL/minute simulated automotive exhaust containing 10% water and 15%  $\text{CO}_2$ . No change in light off order was observed by the addition of  $\text{CO}_2$  and water