

## SUPPORTING INFORMATION

### **Substrate-Support Interactions Mediate Hydrogenation of Phenolic Compounds by Pd/CeO<sub>2</sub> Nanorods**

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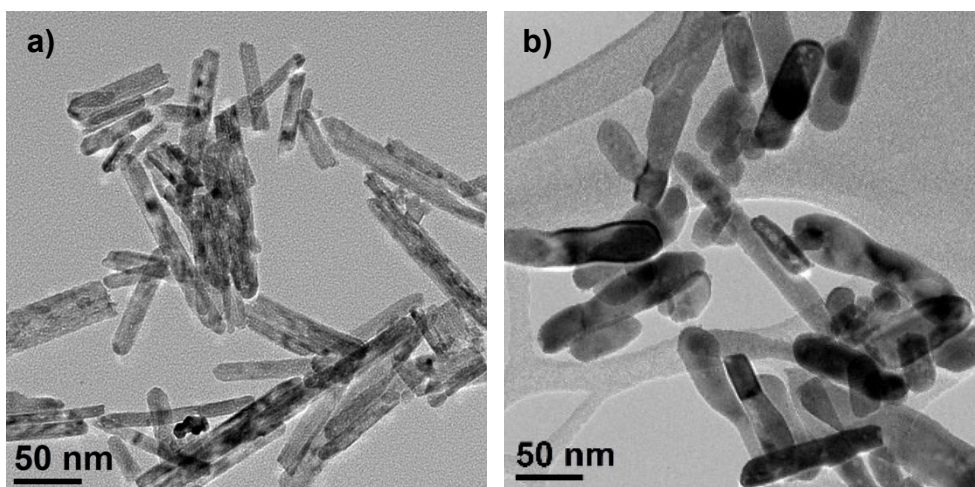
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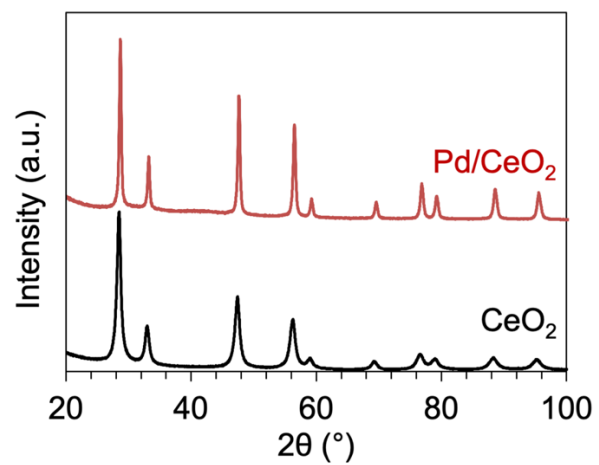
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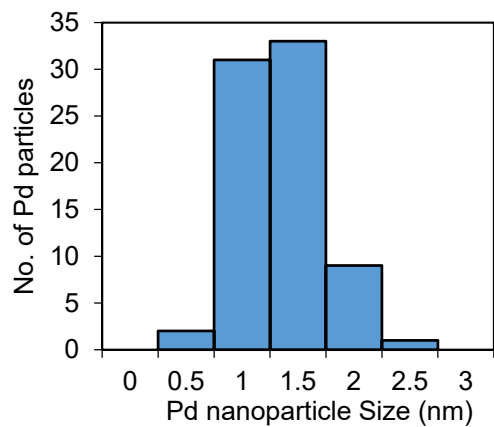
## Supporting Figures



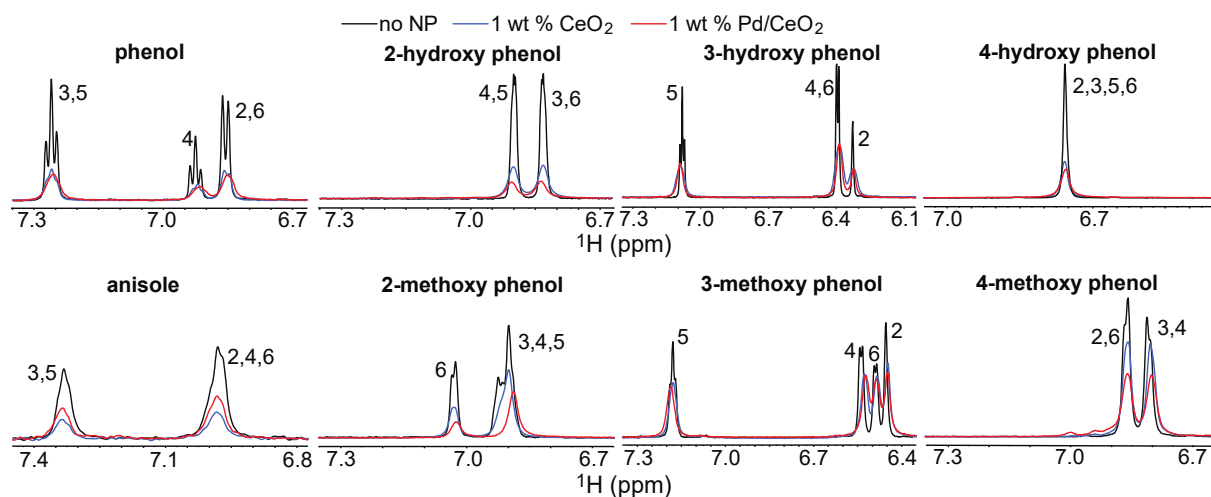
**Figure S1. NP morphology.** Low magnification images of (A) CeO<sub>2</sub> nanorods, and (B) Pd/CeO<sub>2</sub> nanorods. Overall we collected and analyzed 32 images across the four quadrants of the grid. We did not observe any area that presents particles with a different morphology.



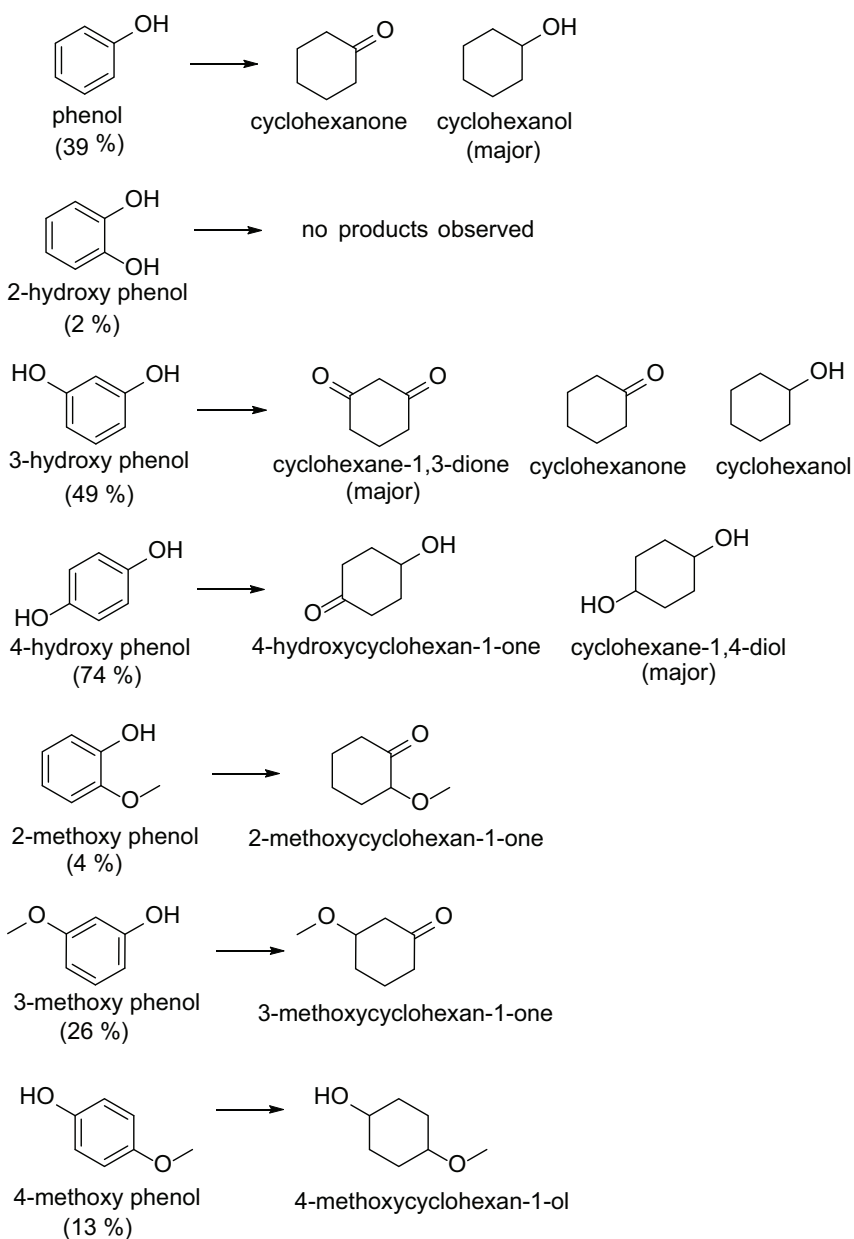
**Figure S2. XRD patterns of the materials.** The XRD patterns the CeO<sub>2</sub> and Pd/CeO<sub>2</sub> nanorods are colored black and red, respectively.



**Figure S3. Pd particle size.** Histogram of the Pd particle sizes obtained from the TEM images of Pd/CeO<sub>2</sub>. The average size of 76 particles counted is 1.4 nm.



**Figure S4.  $^1\text{H}$  spectra of the analyzed samples.**  $^1\text{H}$  NMR spectra of PhOH, anisole, and the hydroxy and methoxy phenols investigated here are shown. Spectra measured in the absence of NPs are black. Spectra measured in the presence of 1 wt %  $\text{CeO}_2$  or  $\text{Pd/CeO}_2$  are colored blue or red, respectively. All spectra were acquired at a 10 mM concentration of the small molecule. The anisole data are of lower quality due to the fact that the small molecule is lowly soluble in water and interacts weakly with the agarose gel matrix used to stabilize the NP suspension (see “*Preparation of NMR Samples*” in main text).



**Figure S5. Selective hydrogenation of phenols by Pd/CeO<sub>2</sub>.** % conversions (reported in parenthesis below each reactant) for the reactions shown in the Figure were calculated based on the decrease in concentration of the starting materials following 7 h incubation with 1 wt % Pd/CeO<sub>2</sub> at 35 °C and 1 bar H<sub>2</sub>(g). Products were not quantified although they were identified by GC-MS. No product of total hydrogenation (hydrodeoxygenation) was detected. All reactions were selective giving either a single product or a product that was much more abundant than any other byproducts.

## Supporting Tables

**Table S1.** Physicochemical properties of the nanomaterials.

|                              | $S_{\text{BET}}$<br>( $\text{m}^2/\text{g}$ ) <sup>a</sup> | CeO <sub>2</sub> Cryst.<br>Size (nm) <sup>b</sup> | Pd load<br>(wt %) <sup>c</sup> | Pd Particle<br>Size (nm) <sup>d</sup> | Pd Cryst.<br>Size (nm) <sup>e</sup> |
|------------------------------|--|---|--------------------------------|---------------------------------------|-------------------------------------|
| CeO <sub>2</sub> nanorods    | 69   | 13  | -                              | -                                     | -                                   |
| Pd/CeO <sub>2</sub> nanorods | 39   | 25  | 1.1                            | 1.4 nm                                | 1.3 nm                              |

<sup>a</sup> From N<sub>2</sub> physisorption analysis.

<sup>b</sup> From XRD pattern and Scherrer equation.

<sup>c</sup> From ICP-OES measurement.

<sup>d</sup> From TEM images.

<sup>e</sup> From H<sub>2</sub> pulse chemisorption.