



Supporting Information

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# **Direct Phenol Synthesis by Selective Oxidation of Benzene with Molecular Oxygen on a N-interstitial Re Cluster/Zelite Catalyst\*\***

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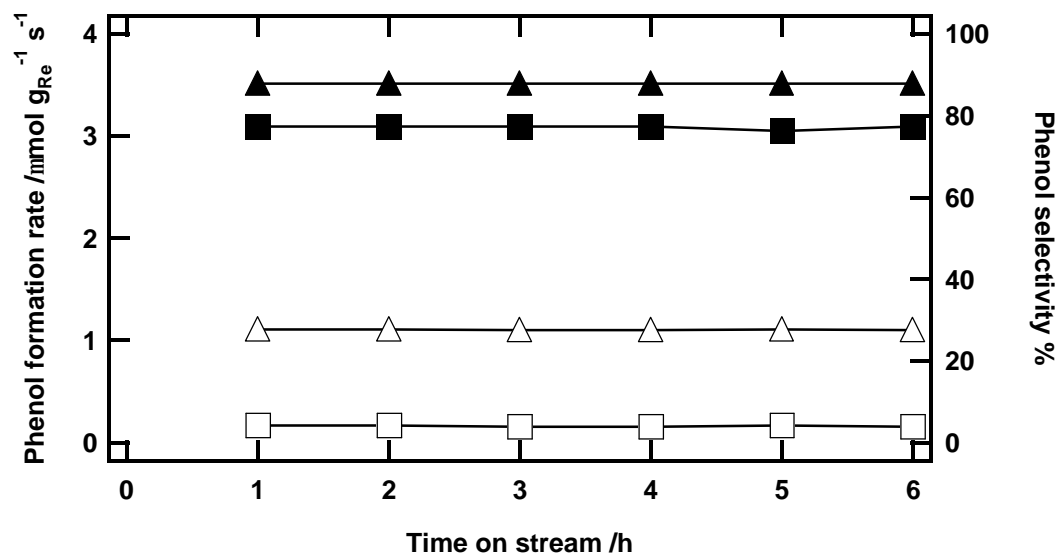
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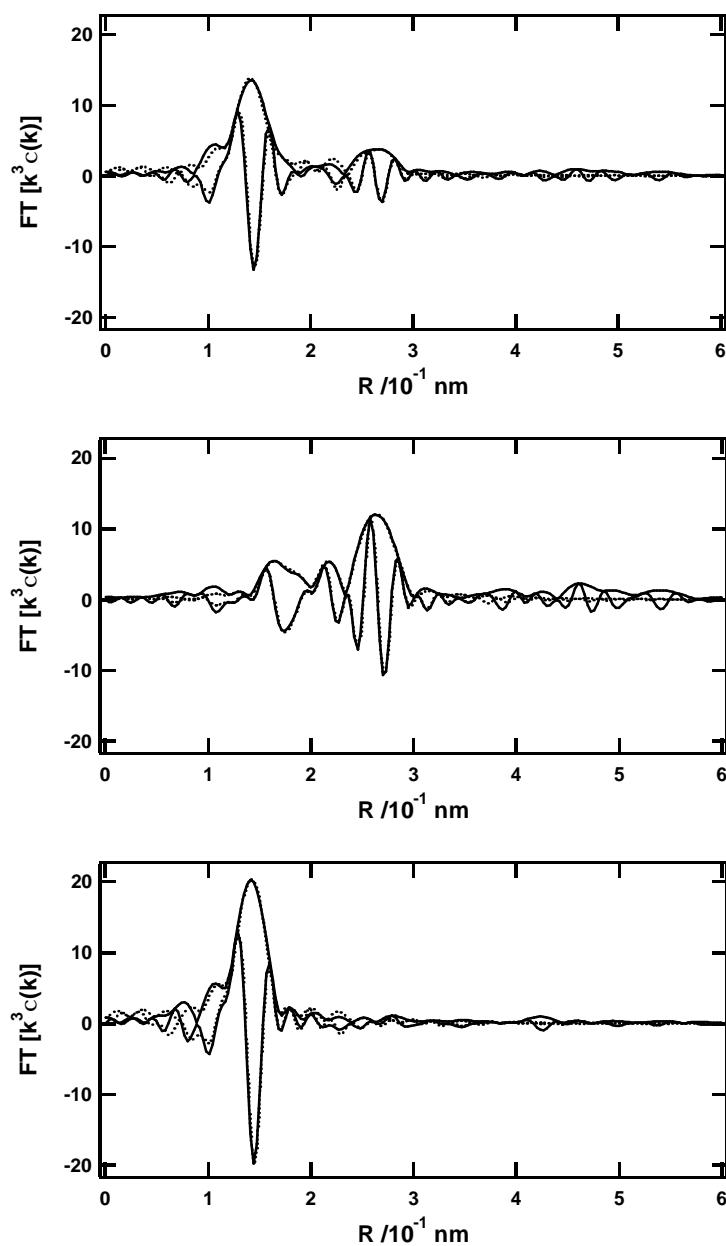
Department of Complexity Science and Engineering, Graduate School of Frontier Sciences,

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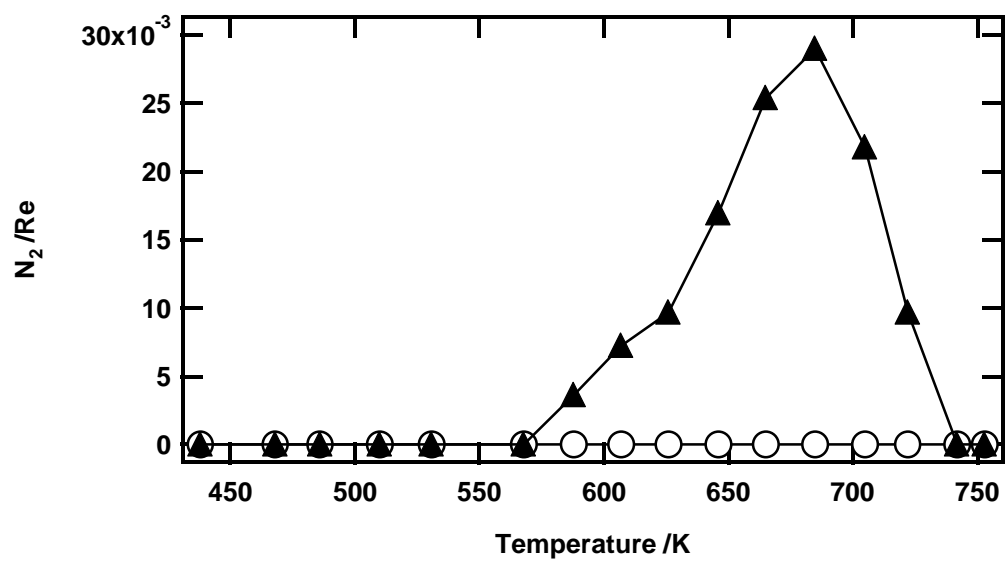
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Supporting Information 1. Catalytic performances for the selective benzene oxidation under the steady-state conditions on the Re/HZSM-5 catalyst (Re: 0.58 wt%, SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> = 19) at 553 K.  $\blacktriangle$ : phenol formation rate on Re-CVD/HZSM-5,  $\blacksquare$ : phenol selectivity on Re-CVD/HZSM-5,  $\triangle$ : phenol formation rate on Re-impreg/HZSM-5,  $\square$ : phenol selectivity on Re-impreg/HZSM-5.



Supporting Information 2. Re L<sub>2</sub>-edge EXAFS Fourier-transforms for Re/HZSM-5 (Re: 0.58 wt%, CVD, SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> = 19) after He treatment (top), after the NH<sub>3</sub> treatment for 2 h (middle), and after the steady-state reaction (bottom). Solid and dotted spectra represent observed and fitted data (absolute and imaginary parts), respectively.



Supporting Information 3. N<sub>2</sub> TPD spectra for the Re/HZSM-5 catalyst (Re: 0.58 wt%, CVD, SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> = 19) (.) and HZSM-5 (.), treated with NH<sub>3</sub> at 553 K for 2 h.