

Electronic Supplementary Material

Room-temperature synthesis of nanoceria for degradation of organophosphate pesticides and its regeneration and reuse

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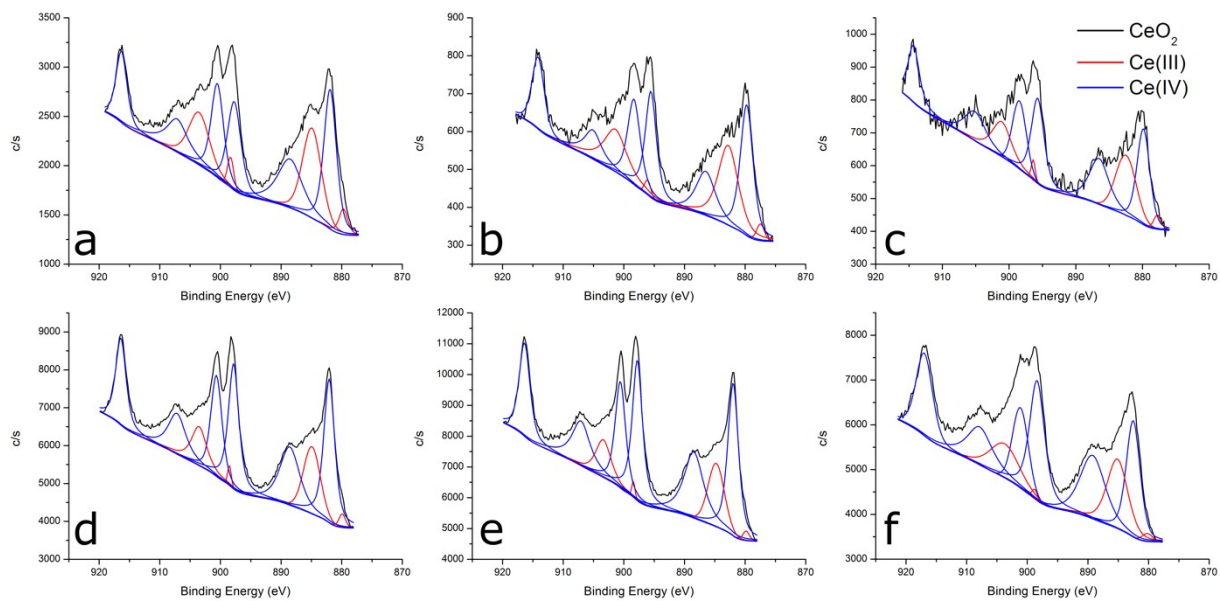


Fig. 1S.: XPS graphs of samples prepared at a) 5, b) 20, c) 40, d) 60, e) 80 and f) 95 °C.

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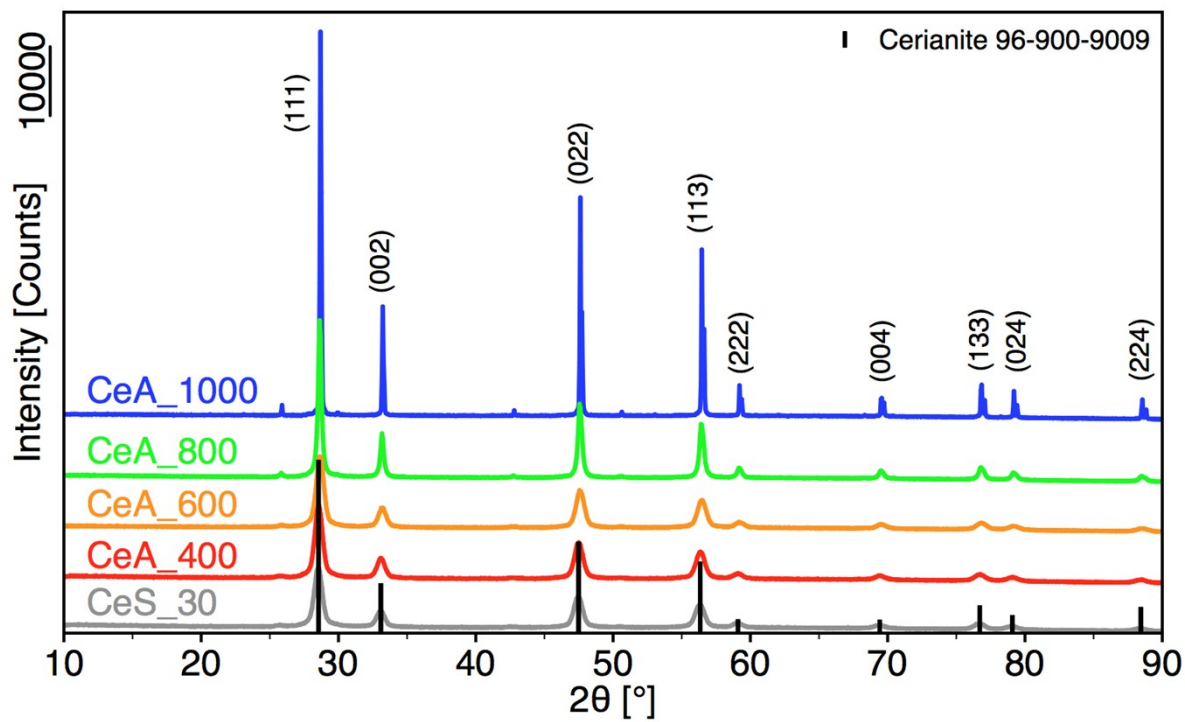


Fig. 2S.: X-ray powder diffraction patterns of samples annealed at different temperatures with marked Cerianite lines.

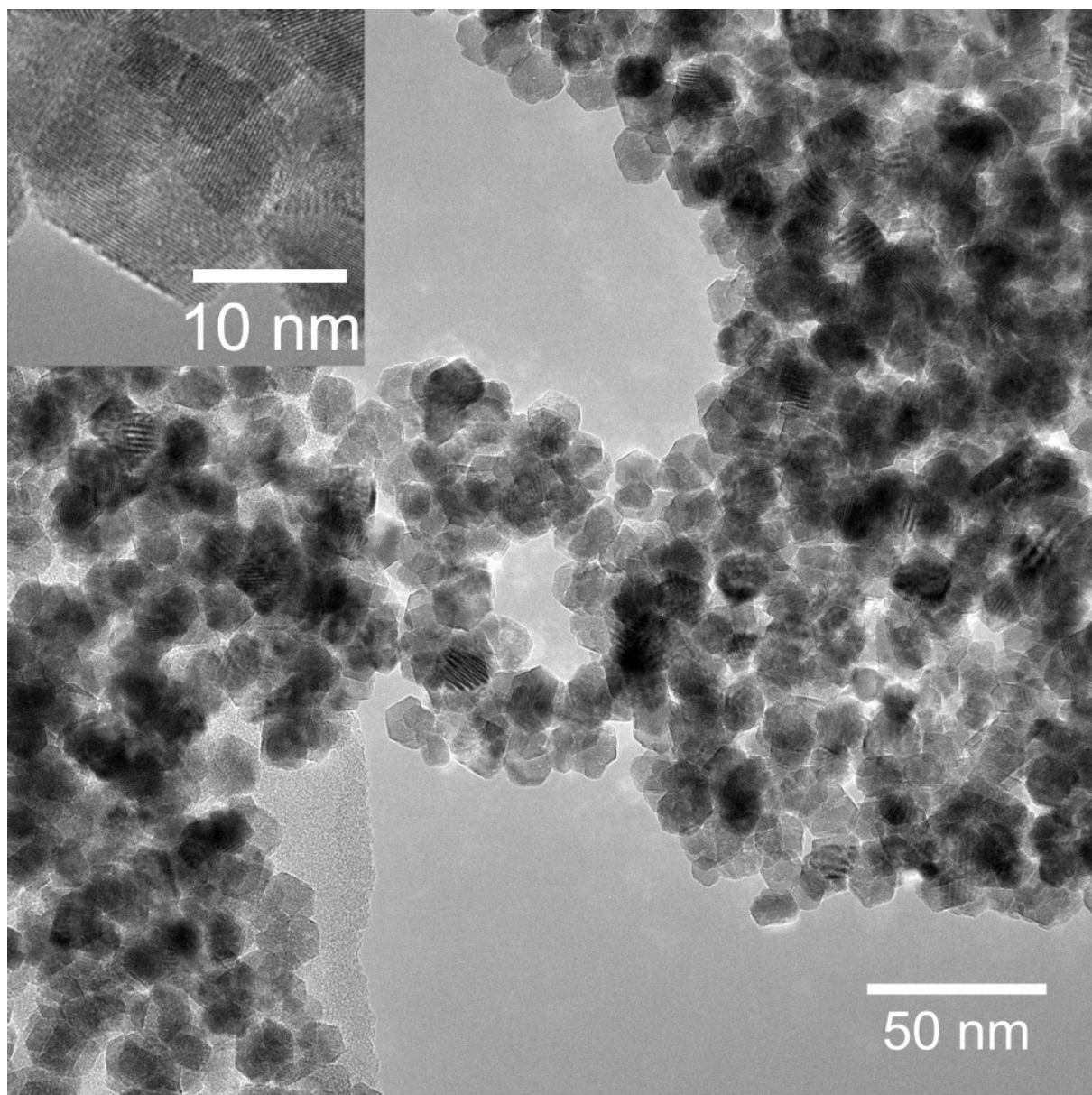


Fig 3S.: Transmission electron microscope image of sample CeS₃₀

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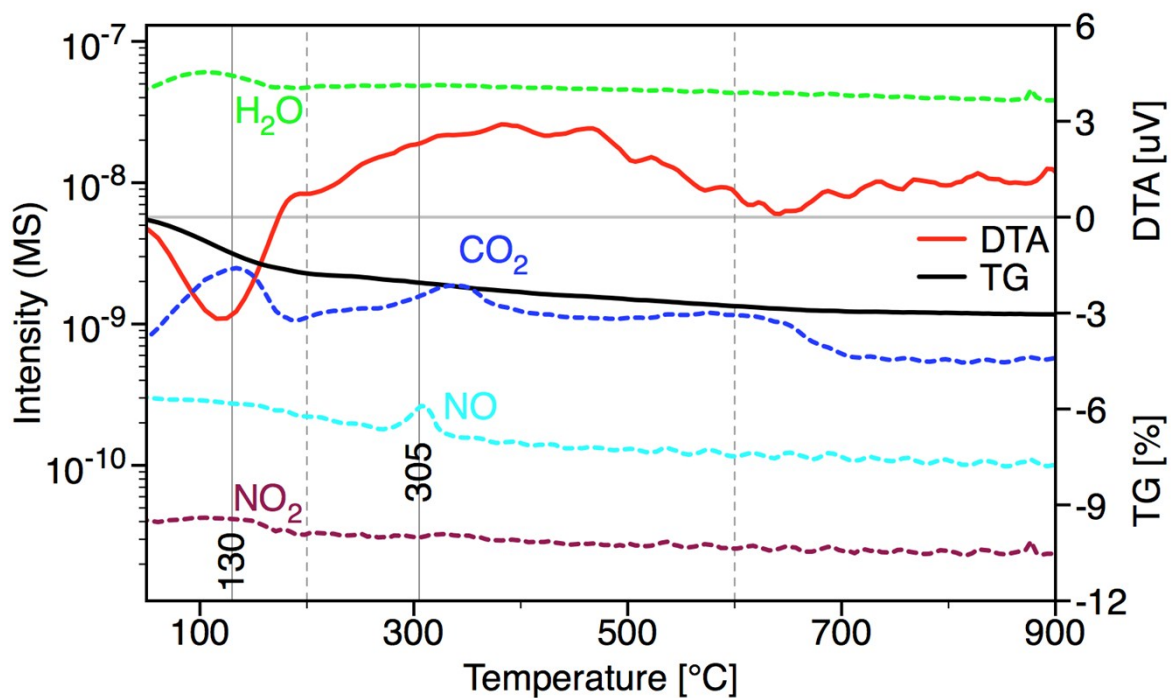


Fig 4S Thermal gravimetric (black) and differential thermal analysis (red), along with records of released water (green), carbon dioxide (dark blue), nitrogen dioxide (dark red) and nitrous oxide (light blue) from the mass spectrometer for the scale-up samples prepared at 30 °C.

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The flow rate of the mobile phase was set to $1.0 \text{ mL} \cdot \text{min}^{-1}$ in the entire gradient, which is described in Table 1S in detail, $30 \text{ }^\circ\text{C}$ column temperature, and $15 \text{ }\mu\text{L}$ volume injection. Data were collected at set wavelengths of 270 nm (PM) and 280 nm (4-NP). Data collection and evaluation was performed using the Chromeleon Chromatography Data System (CDS) software (Thermo Scientific).

Tab. 1S.: Gradient sets for HPLC measurement with mobile phase as A) H_2O - HCOOH (0.1%), B) MeCN - HCOOH (0.1%) and C) MeOH - HCOOH (0.1%).

Kinetics test			Reusability test			
Time	A	B	Time	A	B	C
min	%		min	%		
-1.5	70	30	-1.5	60	20	20
0	70	30	0	60	20	20
2.5	40	60	3	5	47.5	47.5
5	5	95	5	5	47.5	47.5

Tab. 2S.: Measured c_{60}/c_0 molar ratios for PM and 4-NP, their sums and degree of conversion α_{60} for each catalyst reuse cycle. The immersion of the catalyst in water is indicated in the table.

Cycle	c_{60}/c_0 [PM]	c_{60}/c_0 [4-NP]	$\Sigma(c_{60}/c_0)$	α_{60} [PM]
				%
1 st	0.50	0.43	0.93	50.3
2 nd	0.75	0.21	0.96	24.6
3 th	0.81	0.09	0.90	19.2
<i>Water washing for 24 hours</i>				
4 th	0.66	0.30	0.95	34.4
5 th	0.91	0.09	1.00	9.4
6 th	0.95	0.04	0.99	4.9
<i>Water washing for 48 hours</i>				
7 th	0.59	0.34	0.93	41.3
8 th	0.89	0.07	0.96	10.8
9 th	0.92	0.07	0.99	8.0