

# Supplementary Information

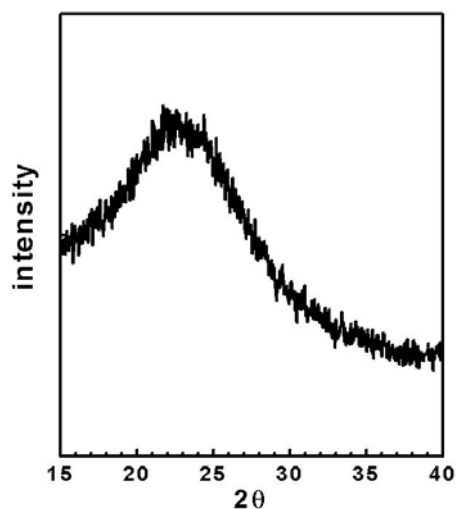
## Supported PEG-Phase Nanoparticles and their Application in Palladium-Catalyzed Aerobic Oxidation in Supercritical Carbon Dioxide

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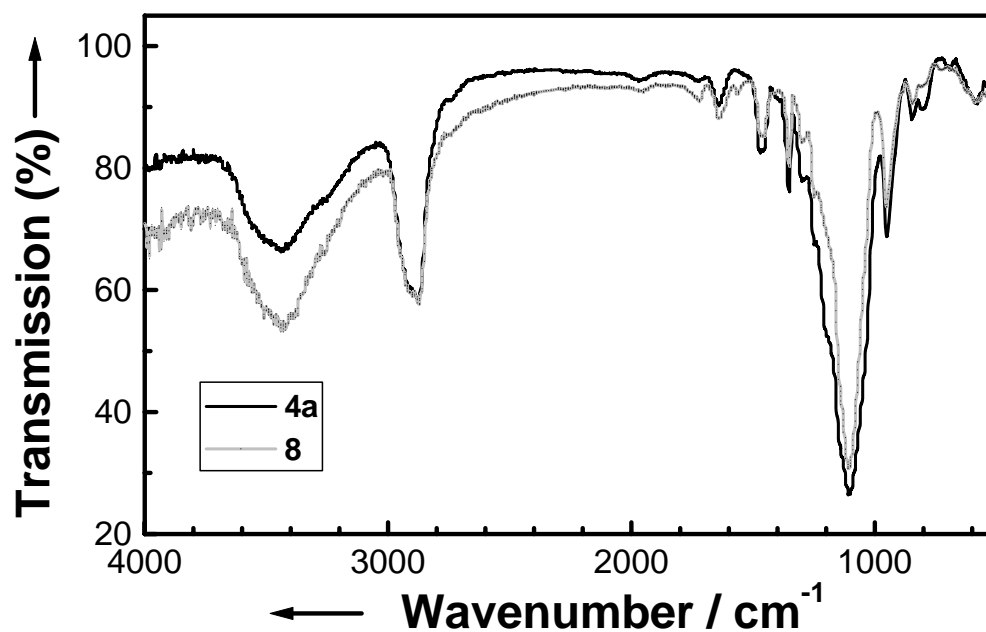
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### Characterization of the resulting solid catalysts by XRD, IR, TEM and <sup>29</sup>Si MAS NMR

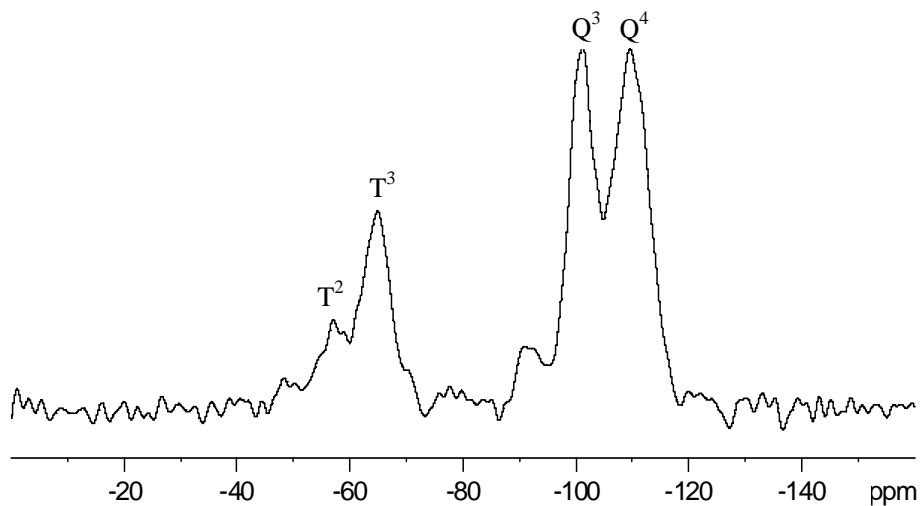
The X-ray powder patterns for qualitative phase analysis were collected on a Stoe STADI P transmission diffractometer in Debye-Scherrer geometry with a primary monochromator curved germanium (111) and a linear position sensitive detector. The used radiation was Cu  $k_{\alpha 1}$ : 1.54060 Å. The data were collected in the range between 0 to 10° 2 $\theta$  with a step width of 0.01° 2 $\theta$ . For the measurements, the sample was prepared between two polyacetate foils. IR spectra were performed with Nicolet Magna-IR 750 instrument. The <sup>29</sup>Si MAS NMR spectroscopy were recorded on a Bruker Avance 500WB instrument using a 4-mm MAS probe at a spinning rate of 10 kHz, 30 s recycle delay, 2,800 scans, and 2.2  $\mu$ s  $\pi/4$  pulse. Nitrogen sorption isotherms were measured at 77 K with a Quantachrome instrument Nova 3000e sorption analyzer. Prior to the measurements, the samples were evacuated at 393 K for 8 h. Transmission electron microscopy (TEM) were chosen to investigate structural features of the catalysts with a H-7500 instrument. All results on characterization which are not included in the main text are shown in Figures 1S-5S.



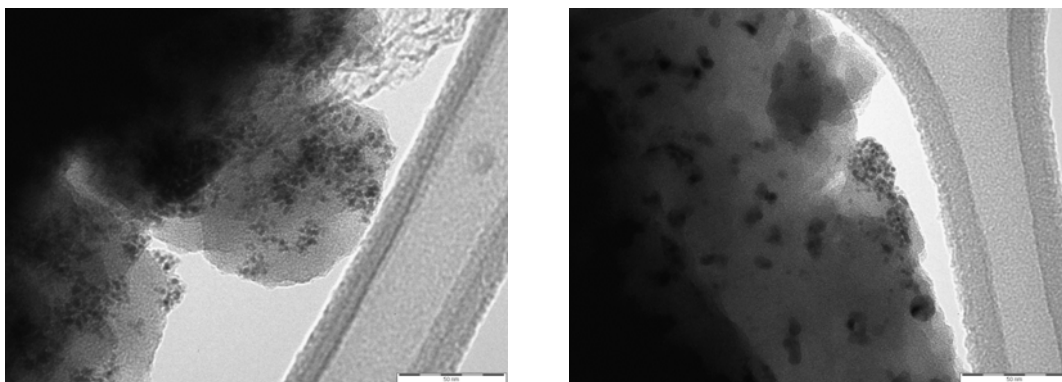
**Fig. 1S** XRD pattern of sample **4a**. Samples **4b** and **7** display the similar characteristics like **4a**. The broad peak around  $2\theta = 20\text{-}30^\circ$  are assigned from the formation of amorphous silica particles.



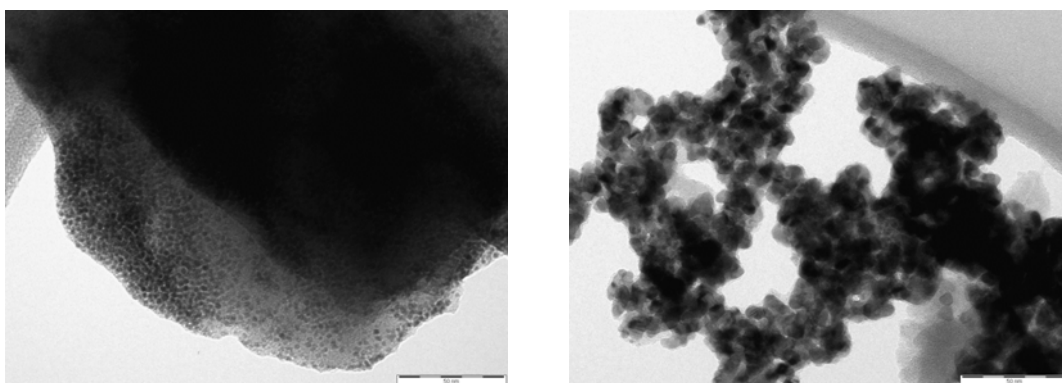
**Fig. 2S** IR spectra of samples **4a** and **8** showing no fundamental differences. The peak around 2900  $\text{cm}^{-1}$  and 1000-1500  $\text{cm}^{-1}$  (some peaks overlapped) are assigned to the adsorption of PEG and the peak around 1000  $\text{cm}^{-1}$  is assigned to the adsorption of silica.



**Fig. 3S**  $^{29}\text{Si}$  MAS NMR spectra of sample **3a**. From the spectra, the resonances near  $-100$  and  $-109$  ppm represent the  $\text{Q}^3$   $\text{HOSi}(\text{OSi})_3$  and  $\text{Q}^4$   $\text{Si}(\text{SiO})_4$  environments of the  $\text{SiO}_4$ , whereas signals about  $65$  ppm and  $56$  ppm arise from  $\text{T}^3$  and  $\text{T}^2$  connectivities of the organic-functionalized silicon centers, respectively.



**Fig. 4S** TEM micrographs of sample **5** before (A) and after reaction (B). The scale bar is  $50$  nm.



**Fig. 5S** TEM micrographs of sample **8** before (left) and after reaction (right). The scale bar is  $50$  nm.