**Time-resolved *in situ* DRIFTS study on $NH_3$–SCR of NO on $CeO_2/TiO_2$ catalyst**

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## 1 Catalyst characterization

The surface morphology of $CeO_2/TiO_2$ catalyst was observed using a FEI Tecnai G2 F20 transmission electron microscope equipped with a high-angle annular dark field (HAADF) detector in STEM mode. The local composition was determined by energy dispersive X-ray spectroscopy (EDS).

The X-ray diffraction (XRD) patterns of fresh $CeO_2/TiO_2$ catalyst, used $CeO_2/TiO_2$ catalyst for $NH_3+O_2$ adsorption, used $CeO_2/TiO_2$ catalyst for $NO+O_2$ adsorption, and used $CeO_2/TiO_2$ catalyst for SCR were measured with a PANalytical X'Pert Powder diffractometer that using Cu Kα radiation (γ= 0.15406 nm) with the X-ray tube operated at 40 kV and 40 mA. Diffraction patterns were recorded between a 2θ range of 10-90° with scaning speed of 5°/min.

X-ray photoelectron spectroscopy (XPS) was performed to investigate the surface chemical states of Ce, Ti and O species in fresh $CeO_2/TiO_2$ catalyst, used $CeO_2/TiO_2$ catalyst for $NH_3+O_2$ adsorption, used $CeO_2/TiO_2$ catalyst for $NO+O_2$ adsorption, and used $CeO_2/TiO_2$ catalyst for SCR with Thermo ESCALAB250Xi. The samples powders, which were transferred and pelletized with a diameter of 0.2 mm before and after testing under an inert atmosphere, were tested by XPS at room temperature. Additionally, the obtained binding energies were referenced to the C 1 s line at 284.6 eV.

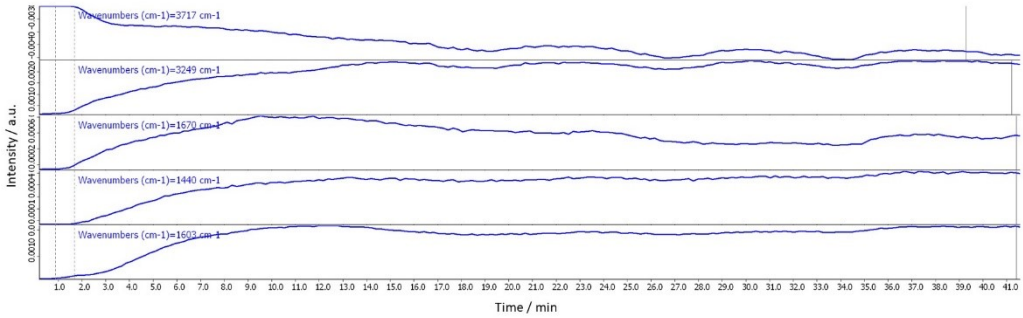


**Fig. S1** Temporal evolution of selected signals during $NH_3$ adsorption on $CeO_2/TiO_2$ catalyst at 100$^{o}$C.

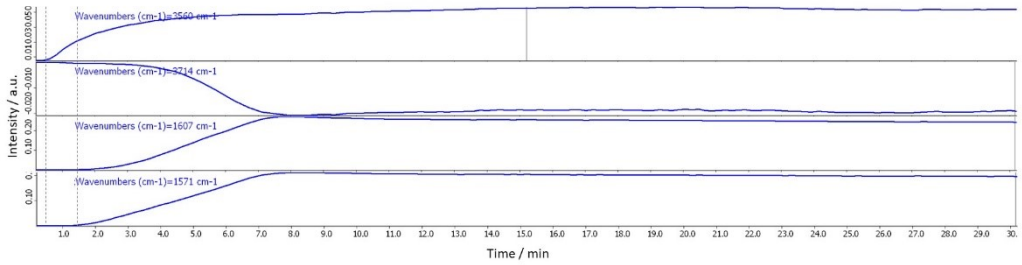


**Fig. S2** Temporal evolution of selected signals during NO adsorption on $CeO_2/TiO_2$ catalyst at 100$^{o}$C.