catalysts

MDPI

SUPPLEMENTARY MATERIAL

Investigation of Iron vanadates for simultaneous carbon soot abatement and NH_3-SCR

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Table S1. B.E.T. surface areas of $Fe_{0.5}Er_{0.5}VO_4$ catalysts.

Catalyst	B.E.T. (m^2/g)
$Fe_{0.5}Er_{0.5}VO_4$	13
8.4% $Fe_{0.5}Er_{0.5}VO_4$/TWS	81
50% $Fe_{0.5}Er_{0.5}VO_4$/TWS	22
8.4% $Fe_{0.5}Er_{0.5}VO_4/CeO_2$	21
50% $Fe_{0.5}Er_{0.5}VO_4/CeO_2$	12
8.4% $Fe_{0.5}Er_{0.5}VO_4$/CZ	40
50% $Fe_{0.5}Er_{0.5}VO_4$/CZ	17
8.4% $Fe_{0.5}Er_{0.5}VO_4/Al_2O_3$	166
50% $Fe_{0.5}Er_{0.5}VO_4/Al_2O_3$	99

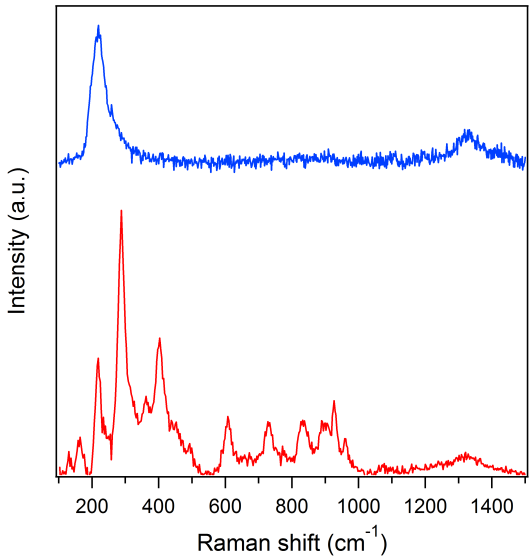

Figure S1. Raman spectra of 8.4wt.%$FeVO_4/Al_2O_3$. In the blue line (grating 1800 l/mm with 5s per accumulation) only Fe_2O_3 and Al_2O_3 Raman shifts are visible. Surface VOx could not be detected. In the red line Raman shifts mainly attributable to $FeVO_4$ and Fe_2O_3 are shown.

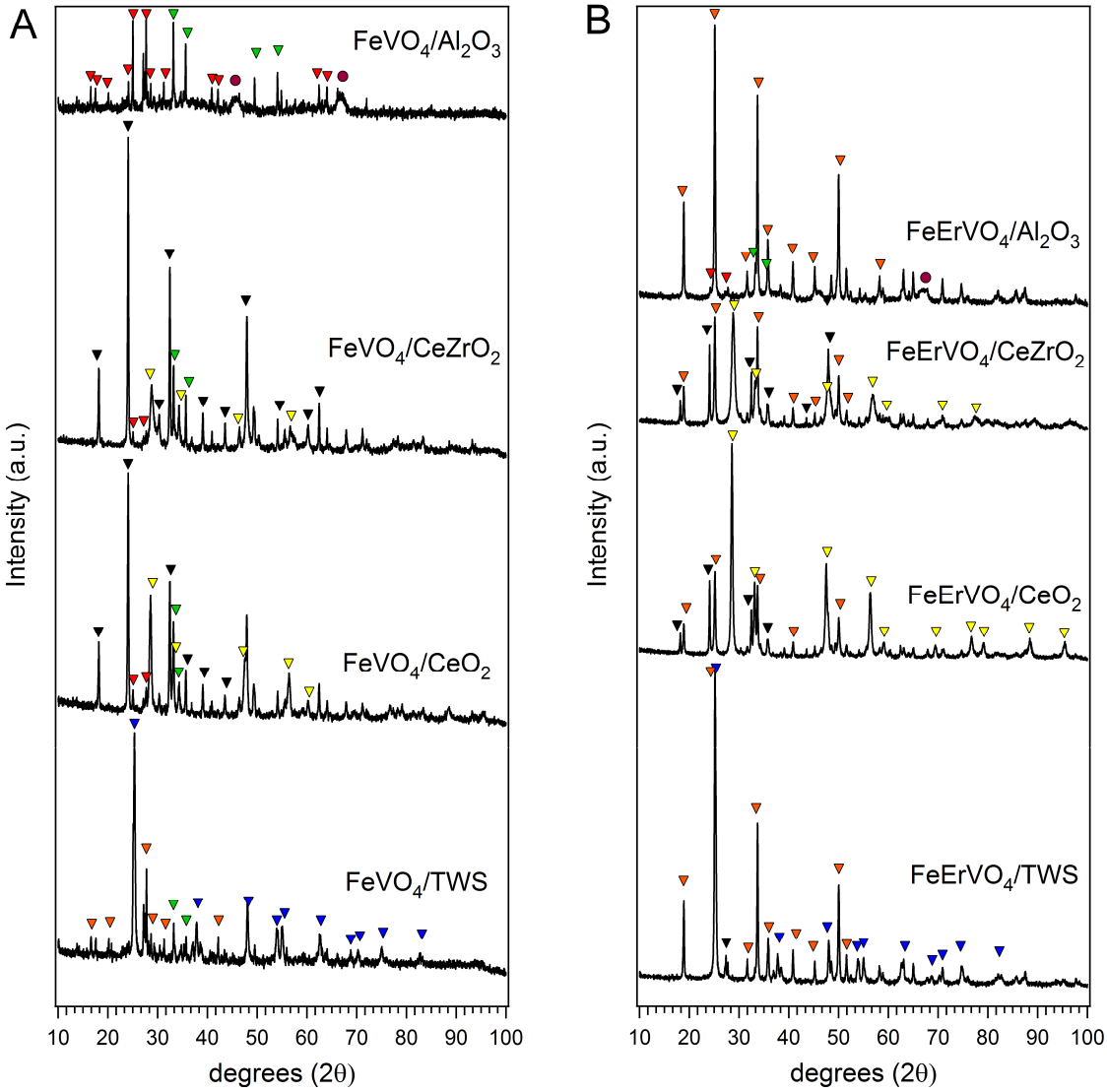

Figure S2. XRD patterns of (A) 50wt.%$FeVO_4$ and (B) 50wt.%$FeErVO_4$ on different supports. ▼TiO_2-anatase, ▼Fe_2O_3, ▼CeO_2 or $CeZrO_2$, ▼$FeVO_4$, ▼$CeVO_4$, ▼$ErVO_4$, ●Al_2O_3.

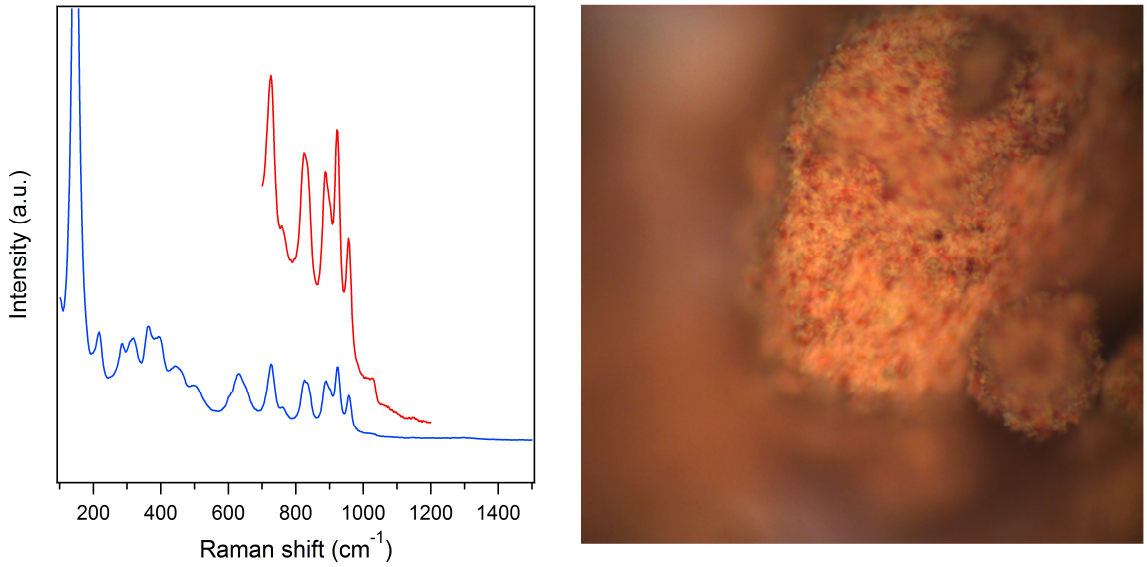

Figure S3. Raman spectra of 50wt.%$FeVO_4$/TWS. The optical image of the sample shows that the dark spots of $FeVO_4$ and Fe_2O_3 are uniformely distributed and all Raman spectra show the Raman shifts of $FeVO_4$. In the blue line (grating 1800 l/mm with 5s per accumulation) anatase Raman shifts are present together with $FeVO_4$ shifts. Surface VOx are highlighted in the red line at around 1000 cm^{-1} taken with higher scan time (20 s for each accumulation) and with a 2400 l/mm grating to increase resolution and intensity.

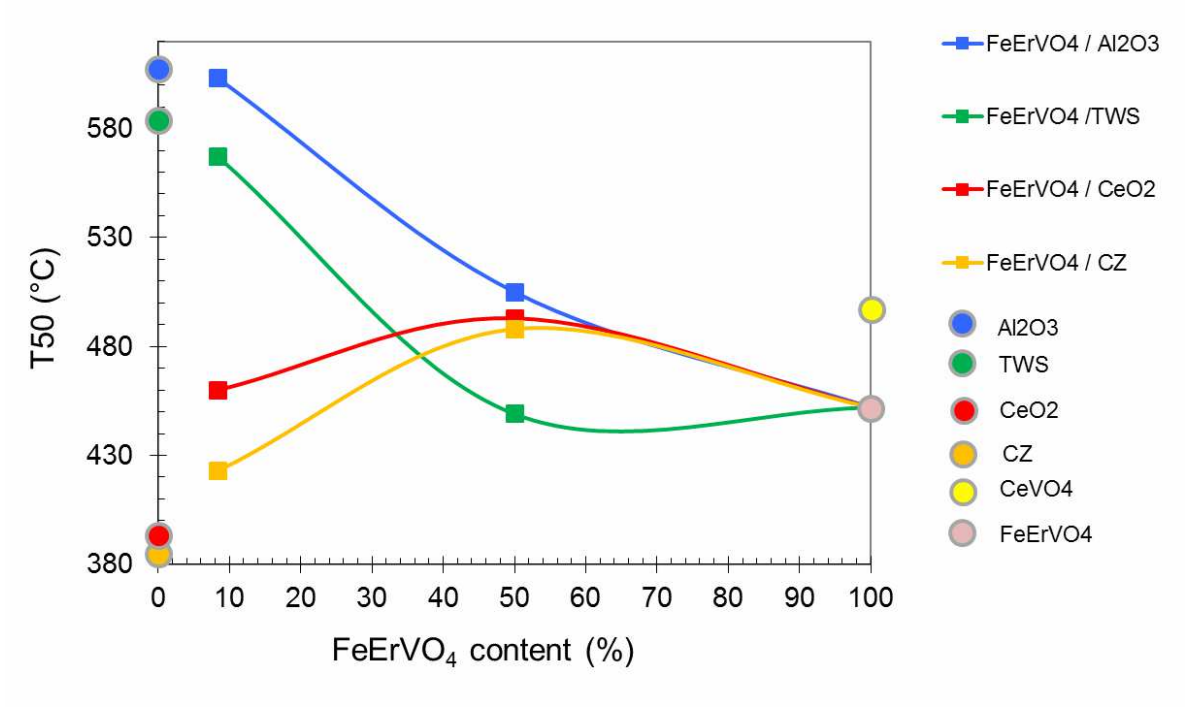

Figure S4. Effect of $FeErVO_4$ loading on soot oxidation activity.

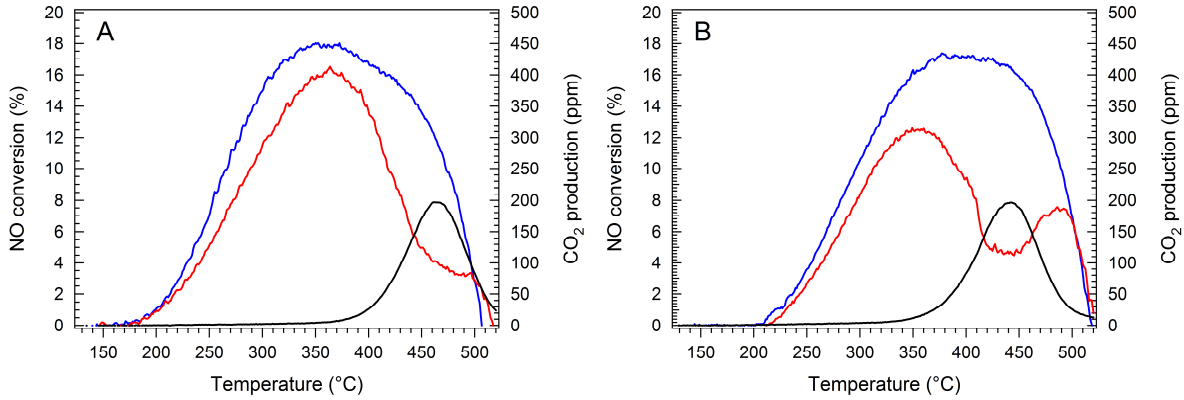

Figure S5. Comparison of SCR catalytic activity of 20 mg catalytic beds of bare catalysts and with soot oxidation conducted simultaneously. Blue lines represent SCR activity of the bare catalysts, red lines represent SCR activity when soot combustion is conducted simultaneously, black lines show CO_2 production during runs. (A) 8.4wt.%$FeVO_4/CeO_2$, (B) 8.4wt.% $FeErVO_4/CeO_2$.

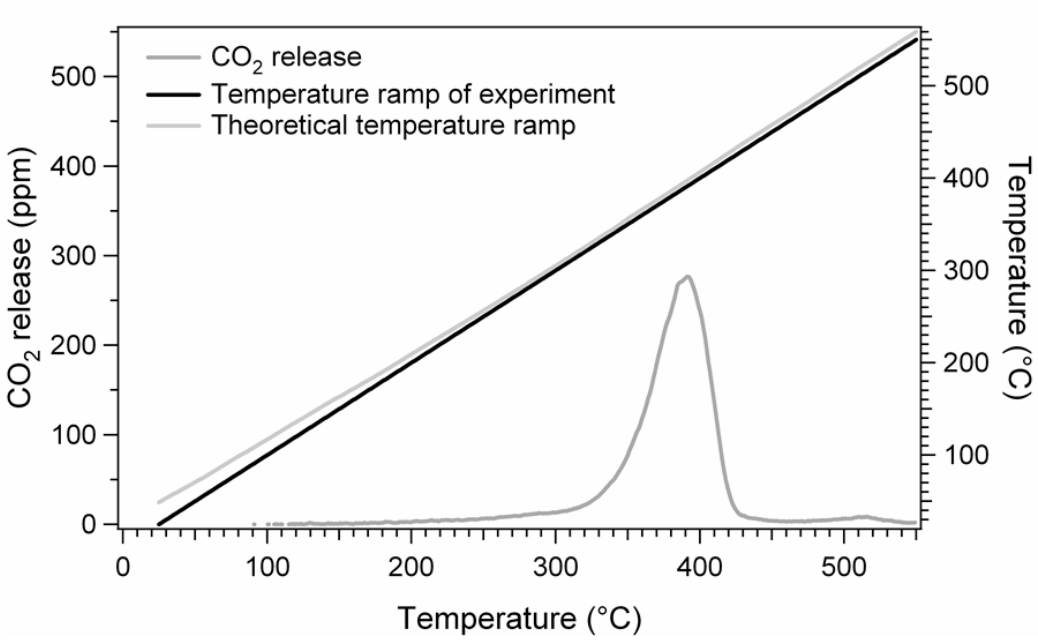

Figure S6. Comparison between theoretical heating ramp and temperature measured in the catalyst bed during soot oxidation reaction on CeO_2 sample (tight contact, soot/catalyst weight ratio of 1:20).

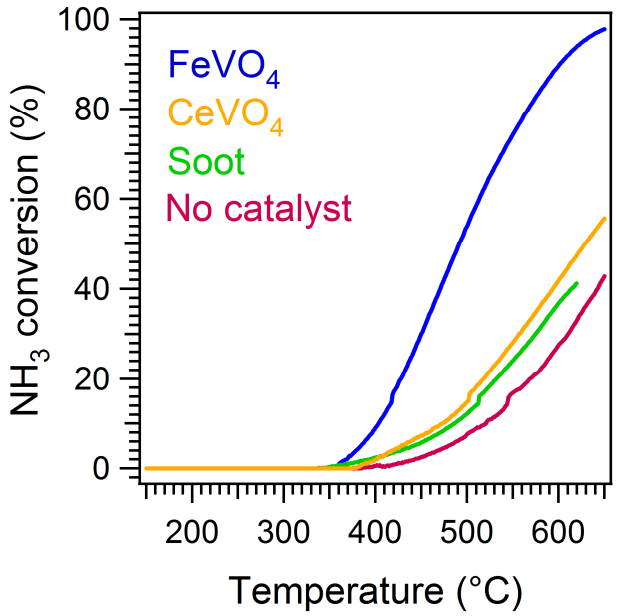

Figure S7. NH_3 oxidation carried out on single catalyst components under the following conditions: catalyst 20 mg, NH_3 500ppm, O_2 10%, N_2 balance, GHSV 900000 h^{-1}. Magenta line: NH_3 conversion curve over empty reactor; green line: NH_3 conversion curve of bare soot; blue lines: NH_3 conversion curve over $FeVO_4$, yellow line: NH_3 conversion over $CeVO_4$.