Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Influence of the Particle Size on Selective 2-Propanol Gas-Phase Oxidation over Co_3O_4 Nanospheres

Tobias Falk, Sven Anke, Hamidreza Hajiyani, Sascha Saddeler, Stephan Schulz, Rossitza Pentcheva, Baoxiang Peng, and Martin Muhler*

Supporting Information

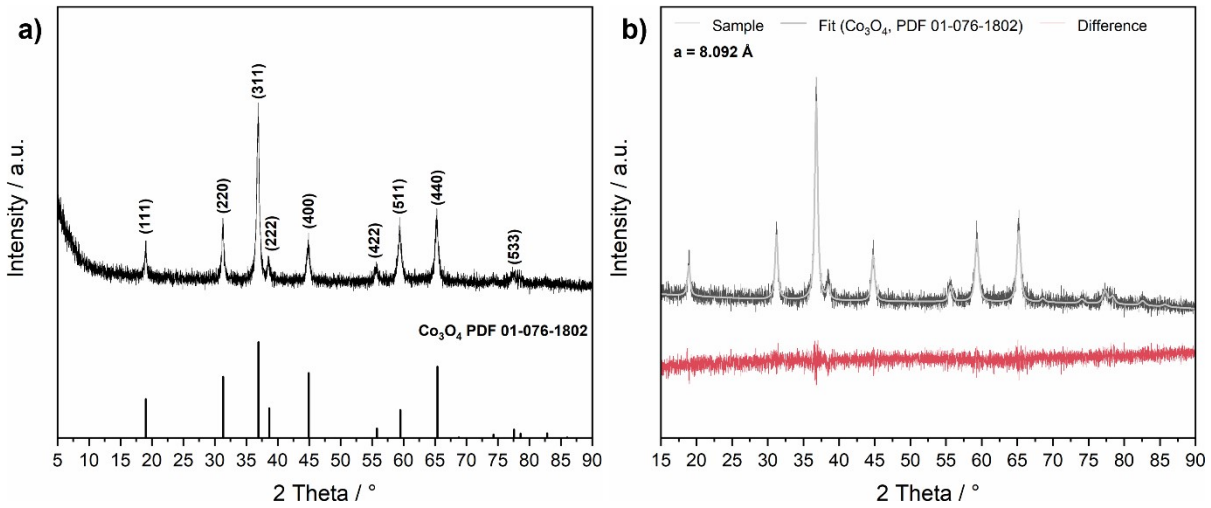

Fig. S1 a) PXRD pattern and b) Rietveld refinement of the spherical Co_3O_4 nanoparticles with a mean diameter of 19 nm.

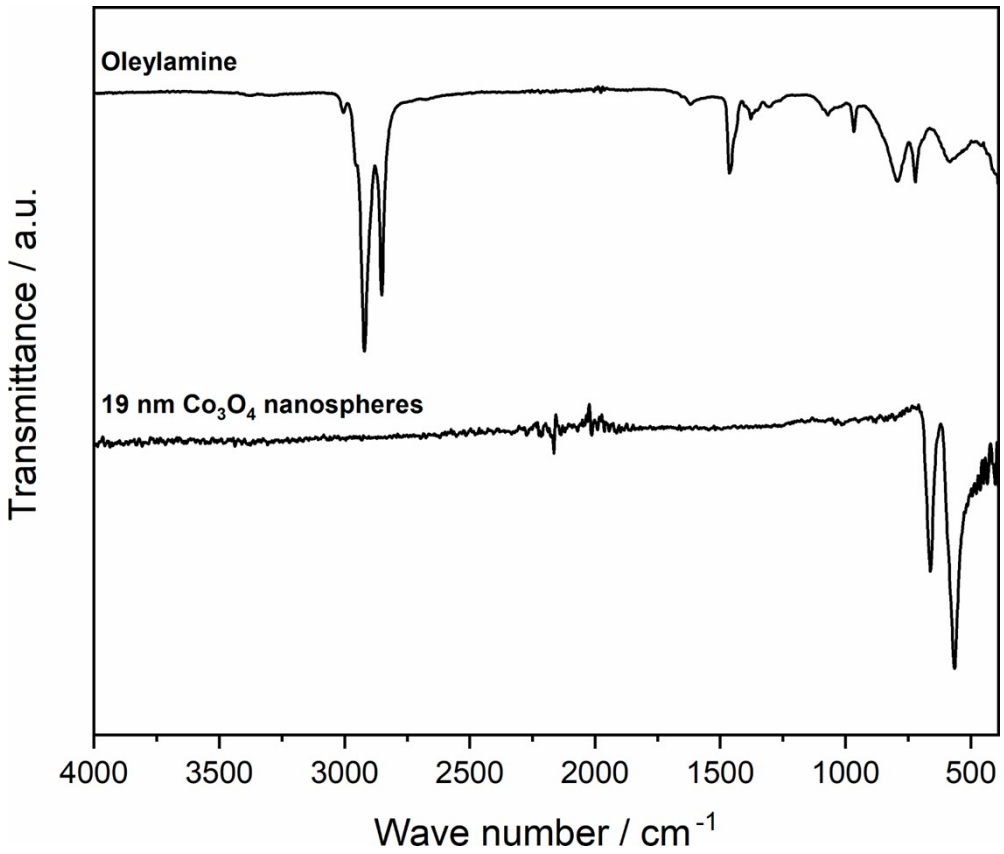

Fig. S2 FTIR spectra of the spherical Co_3O_4 nanoparticles with a mean diameter of 19 nm and the surfactant (oleylamine).

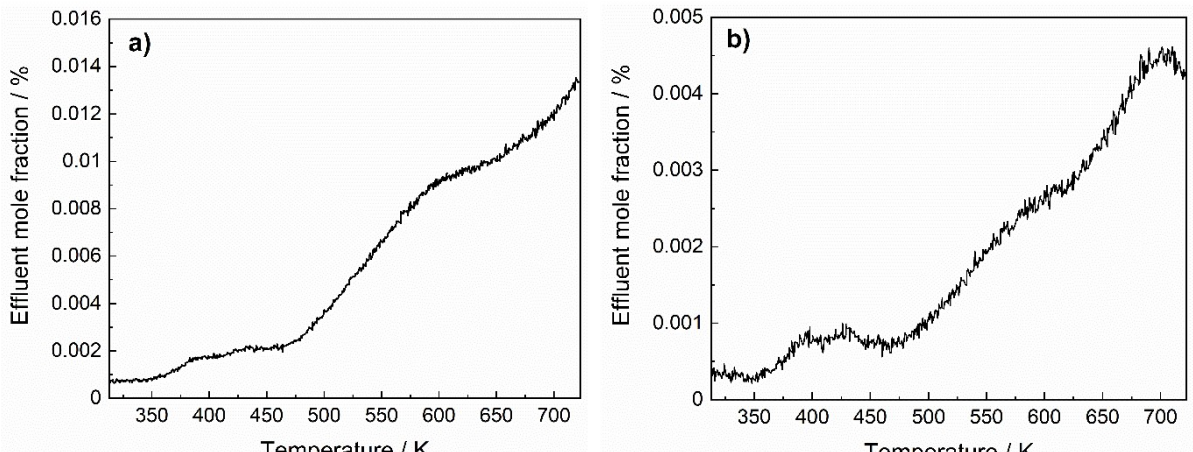

Fig. S3 Effluent mole fraction of O_2 during the O_2 TPD experiment over the Co_3O_4 spherical nanoparticles with a mean diameter of (a) 19 nm and (b) 9 nm after oxidative pretreatment at 723 K. Reprinted with permission from S. Anke, G. Bendt, I. Sinev, H. Hajiyani, H. Antoni, I. Zegkinoglou, H. Jeon, R. Pentcheva, B. Roldan Cuenya, S. Schulz and M. Muhler, Selective 2-Propanol Oxidation over Unsupported Co_3O_4 Spinel Nanoparticles: Mechanistic Insights into Aerobic Oxidation of Alcohols, *ACS Catal.*, 2019, **9**, 5974–5985. Copyright (2019) American Chemical Society.

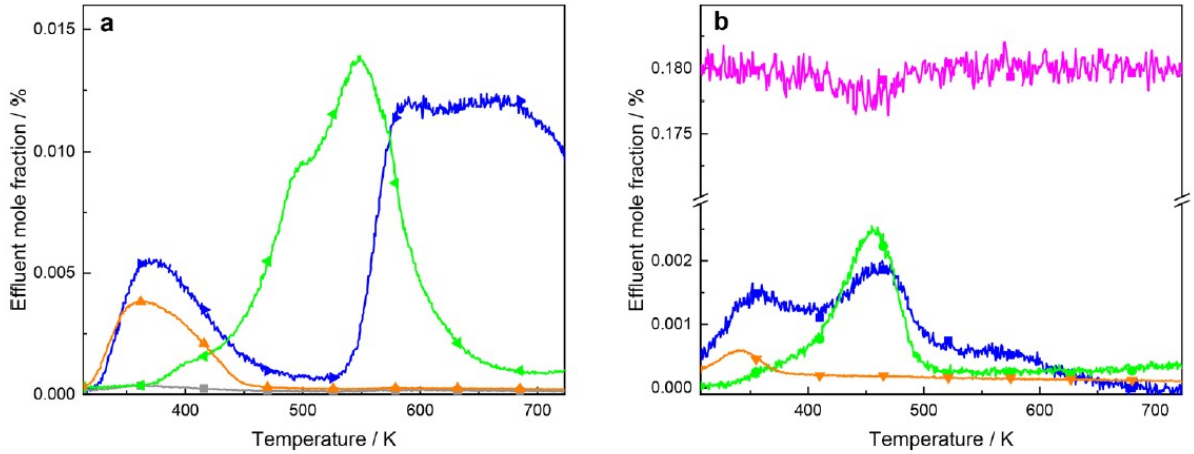

Fig. S4 Effluent mole fractions of $(CH_3)_2CHOH$ (■), O_2 (●), $(CH_3)_2CO$ (▲), $CH_2{=}CHCH_3$ (▼), CO_2 (◀), and H_2O (▶) during the 2-propanol TPD (a) and TPSR (b) experiments over Co_3O_4 spherical nanoparticles with a mean diameter of 9 nm. Reprinted with permission from S. Anke, G. Bendt, I. Sinev, H. Hajiyani, H. Antoni, I. Zegkinoglou, H. Jeon, R. Pentcheva, B. Roldan Cuenya, S. Schulz and M. Muhler, Selective 2-Propanol Oxidation over Unsupported Co_3O_4 Spinel Nanoparticles: Mechanistic Insights into Aerobic Oxidation of Alcohols, *ACS Catal.*, 2019, **9**, 5974–5985. Copyright (2019) American Chemical Society.

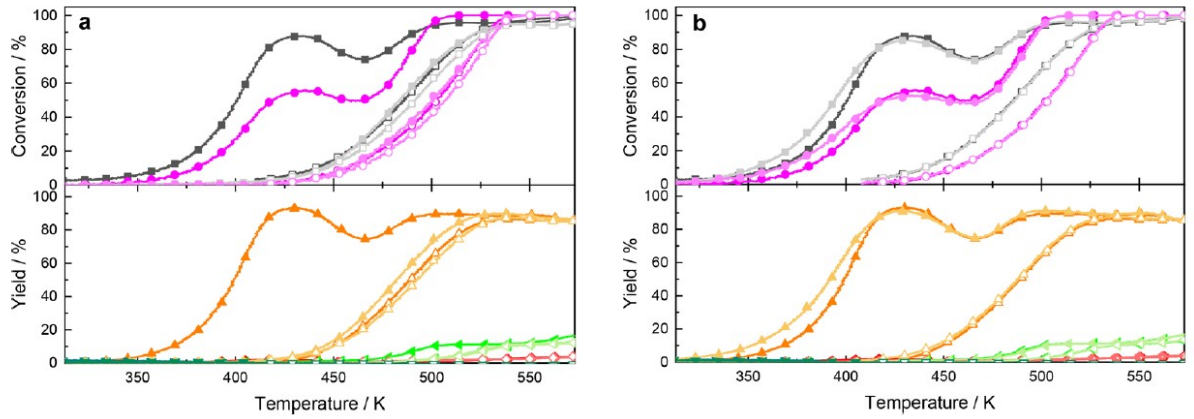

Fig. S5 Conversion and yields during 2-propanol oxidation over Co_3O_4 spherical nanoparticles with a mean diameter of 9 nm: (a) the first and subsequent second run (lighter colors); (b) the first run and after additional oxidative pretreatment the third run (lighter colors). Conversion of $(CH_3)_2CHOH$ (■) and O_2 (●) and yields of $(CH_3)_2CO$ (▲), $CH_2{=}CHCH_3$ (▼), CO_2 (◀), and H_2 (◆). Traces with full symbols were obtained during heating and traces with hollow symbols during cooling. Reprinted with permission from S. Anke, G. Bendt, I. Sinev, H. Hajiyani, H. Antoni, I. Zegkinoglou, H. Jeon, R. Pentcheva, B. Roldan Cuenya, S. Schulz and M. Muhler, Selective 2-Propanol Oxidation over Unsupported Co_3O_4 Spinel Nanoparticles: Mechanistic Insights into Aerobic Oxidation of Alcohols, *ACS Catal.*, 2019, **9**, 5974–5985. Copyright (2019) American Chemical Society.

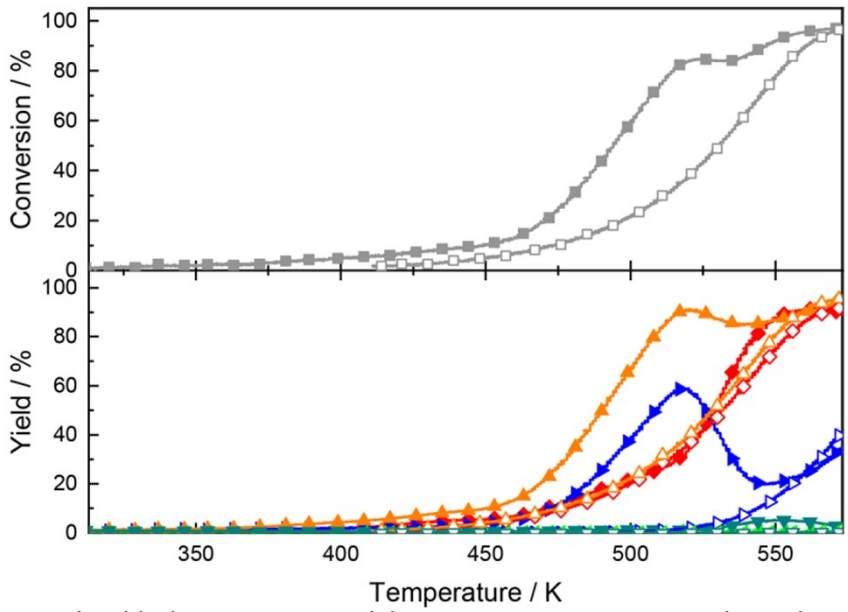

Fig. S6 Conversion and yields during 2-propanol decomposition over Co_3O_4 spherical nanoparticles with a mean diameter of 9 nm. Conversion of $(CH_3)_2CHOH$ (■) and yields of $(CH_3)_2CO$ (▲), $CH_2=CHCH_3$ (▼), CO_2 (◀), H_2O (▶) and H_2 (◆). Traces with full symbols were obtained during heating and traces with hollow symbols during cooling. Reprinted with permission from S. Anke, G. Bendt, I. Sinev, H. Hajiyani, H. Antoni, I. Zegkinoglou, H. Jeon, R. Pentcheva, B. Roldan Cuenya, S. Schulz and M. Muhler, Selective 2-Propanol Oxidation over Unsupported Co_3O_4 Spinel Nanoparticles: Mechanistic Insights into Aerobic Oxidation of Alcohols, *ACS Catal.*, 2019, **9**, 5974–5985. Copyright (2019) American Chemical Society.