Supporting Information

Selective Cyclohexene Oxidation with O_2, H_2O_2 and *tert*-Butyl Hydroperoxide over Spray-Flame Synthesized $LaCo_{1-x}Fe_xO_3$ Nanoparticles

Julia Büker,[a] Baris Alkan,[b] Qi Fu,[a] Wei Xia,[a] Jonas Schulwitz,[a] Daniel Waffel,[a] Tobias Falk,[a] Christof Schulz,[b] Hartmut Wiggers,[b] Martin Muhler,[a],[c] and Baoxiang Peng*[a],[c]

[a] Laboratory of Industrial Chemistry, Ruhr-University Bochum, 44780 Bochum, Germany

[b] IVG, Institute for Combustion and Gas Dynamics – Reactive Fluids and CENIDE, Center for Nanointegration Duisburg-Essen, University of Duisburg-Essen, 47057 Duisburg, Germany

[c] Max Planck Institute for Chemical Energy Conversion, 45470 Mülheim an der Ruhr, Germany

*Corresponding author. Email: baoxiang.peng@techem.rub.de

Table S1. Bulk chemical composition of $LaCo_{1-x}Fe_xO_3$ catalysts calculated by EDX measurements at STEM mode.

Catalysts	La/(Co+Fe)	Fe/(Fe+Co)
$LaCoO_3$	1.10 ± 0.03	-
$LaCo_{0.8}Fe_{0.2}O_3$	1.19 ± 0.16	0.20 ± 0.03
$LaCo_{0.7}Fe_{0.3}O_3$	1.10 ± 0.12	0.29 ± 0.01
$LaCo_{0.6}Fe_{0.4}O_3$	1.14 ± 0.04	0.36 + 0.01

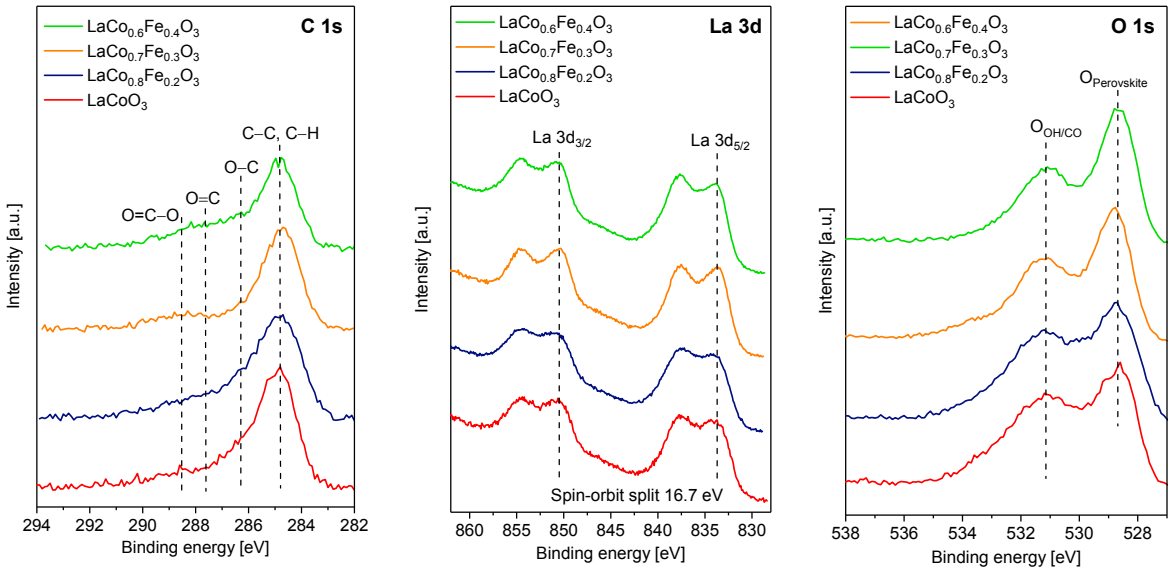

Figure S1. XP spectra of the C 1s, La 3d and O 1s regions of the $LaCo_{1-x}Fe_xO_3$ samples.

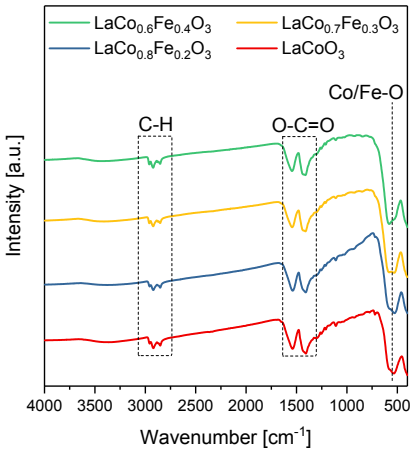

Figure S2. FT-IR spectra of the $LaCo_{1-x}Fe_xO_3$ samples.

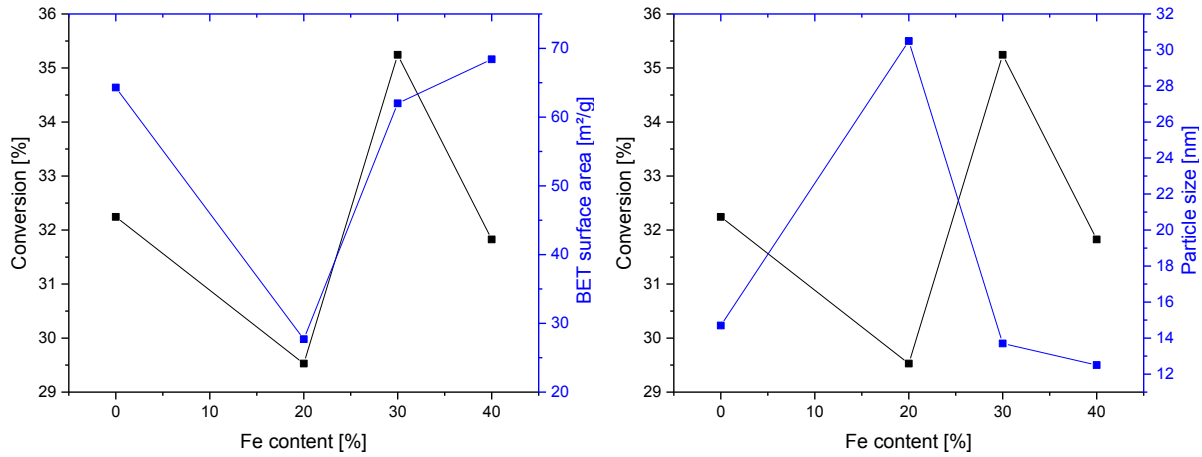

Figure S3. Correlations of cyclohexene conversion with BET surface areas (left) and particle sizes (right) after 2 h reaction over different $LaCo_{1-x}Fe_xO_3$ catalysts.

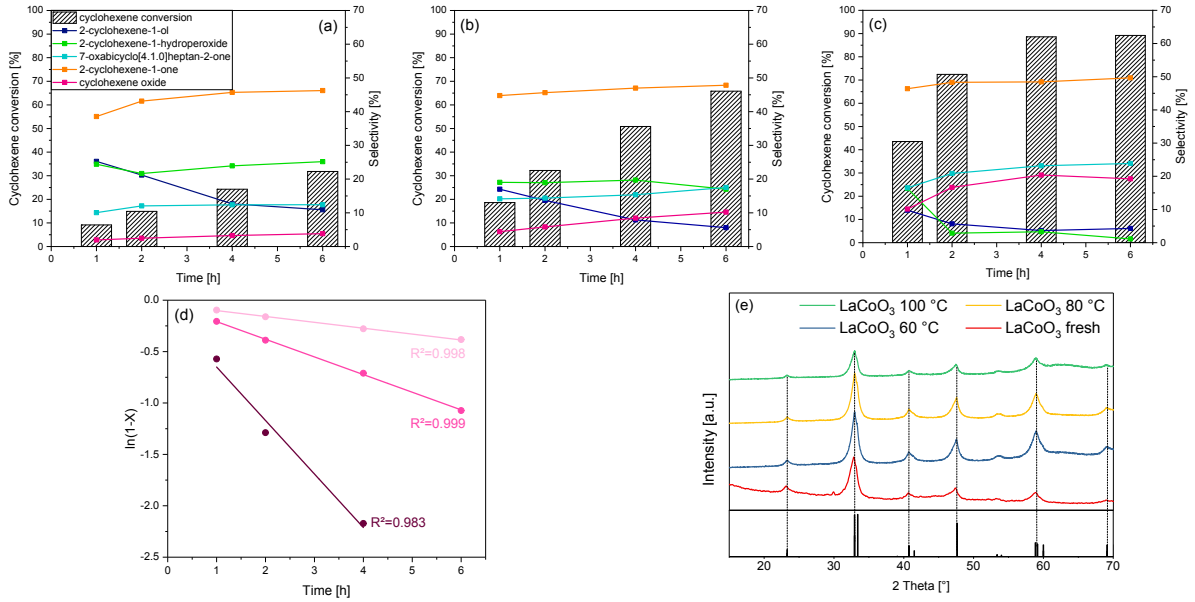

Figure S4. Effect of temperature on cyclohexene oxidation over $LaCoO_3$ at 60 (a), 80 (b) and 100 °C (c), linearized plot of the conversion as a function of time (d) and XRD patterns of used catalysts (e) (red: cyclohexene conversion, dark blue: 2-cyclohexene-1-ol, orange: 2-cyclohexene-1-one, green: 2-cyclohexene-1-hydroperoxide, pink: cyclohexene oxide, light blue: 7-oxabicyclo[4.1.0]heptan-2-one).

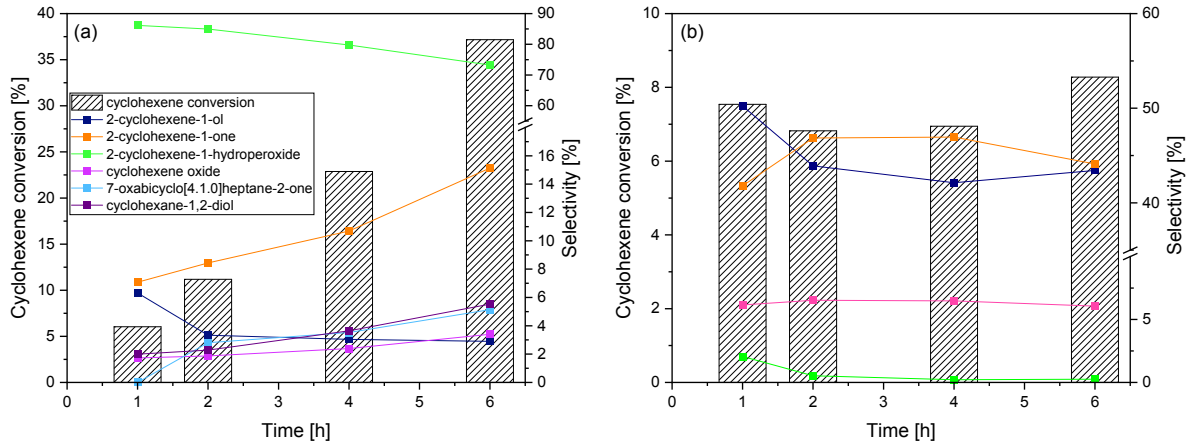

Figure S5. Cyclohexene oxidation under standard conditions in the absence of a catalyst (a) and in the presence of $LaCoO_3$ in N_2 atmosphere.

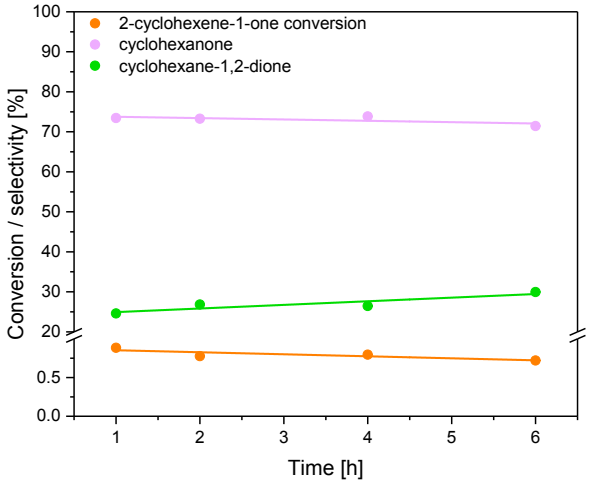

Figure S6. Oxidation of 2-cyclohexene-1-one with O_2 over $LaCoO_3$ under standard conditions.

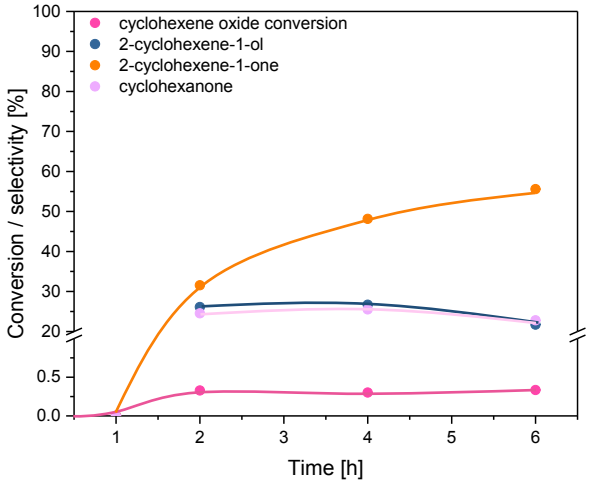

Figure S7. Oxidation of cyclohexene oxide with O_2 over $LaCoO_3$ under standard conditions.

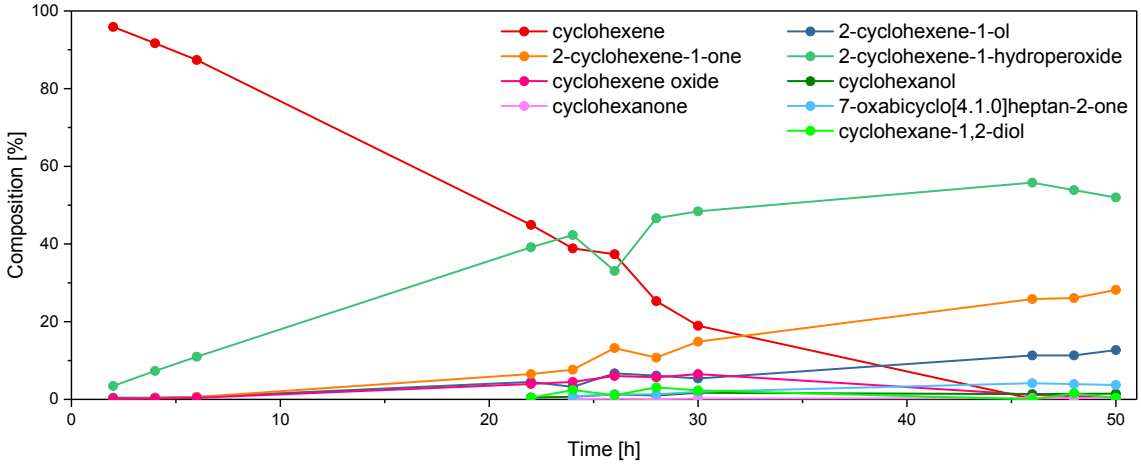

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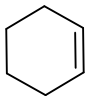
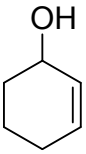
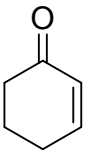
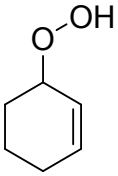
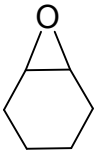
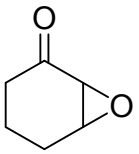
Figure S8. Synthesis of 2-cyclohexene-1-hydroperoxide.

Table S2. Decomposition of 2-cyclohexene-1-hydroperoxide over $LaCoO_3$.

Time [h]	Composition [%]						
							others[a]
0	0.0	16.1	30.0	45.9	0.9	4.1	3.1
1	0.0	16.0	32.6	41.9	0.8	4.4	4.2
2	0.0	16.8	35.0	38.3	0.8	4.8	4.4
4	0.0	18.1	39.5	31.4	0.8	5.5	4.7
6	0.0	18.9	43.4	26.0	0.8	6.0	5.0
Δ	0.0	+ 2.8	+ 13.4	- 19.9	- 0.1	+ 1.9	+ 1.9

[a] Others are cyclohexanone, cyclohexanol and cyclohexane-1,2-diol