## Supplementary materials



Figure S1. Diffractograms generated from the Rietveld refinement for CF-MCM-41 solid.



Figure S2. Low-angle XRD results for the different samples.



**Figure S3.** Mössbauer spectra at 12 K room temperature for the sample Fe<sub>2</sub>O<sub>3</sub>-MCM-41.



Figure S4. XPS spectra showing (a) Fe 2p core level for the solid  $Fe_2O_3$ -MCM-41; (b) Fe 2p core level for the solid CF-MCM-41; (c) Co 2p core level for the catalyst CF-MCM-41.



Figure S5. X-ray diffraction of the CF-MCM-41 sample obtained after the catalytic test.



**Figure S6.** (001) surface of  $CoFe_2O_4$  with different amount of Co on octahedral site at the outermost layer: (a) 0%, (b) 12.5 % and (c) 50%. The related (projected) density of states (P) DOSS are depicted in the right panel (d, e, f).

**Table S1.** Elemental chemical composition from X-ray fluorescence (XRF)and superficial atomic concentrations from XPS results.

Catalyst	Fe/Si	(Fe+Co)/Si	Fe/Co	%[C] <sub>surface</sub>	%[O] <sub>surface</sub>	%[Fe] <sub>surface</sub>	%[Co] <sub>surface</sub>	%[Si] <sub>surface</sub>
Fe <sub>2</sub> O <sub>3</sub> -MCM-41	0.34	-	-	2.00	74.70	0.90	-	22.40
CF-MCM-41	-	0.27	1.80	1.50	73.00	3.00	2.10	20.40
[M] <sub>surface</sub> : M=C, O, Fe, Co and Si, superficial atomic concentration/atom% (XPS).								