Heterogeneous & Homogeneous & Bio- & Nano-
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CATALYSIS

Supporting Information

A Seed-Mediated Approach for the Preparation of Modified Heterogeneous Catalysts

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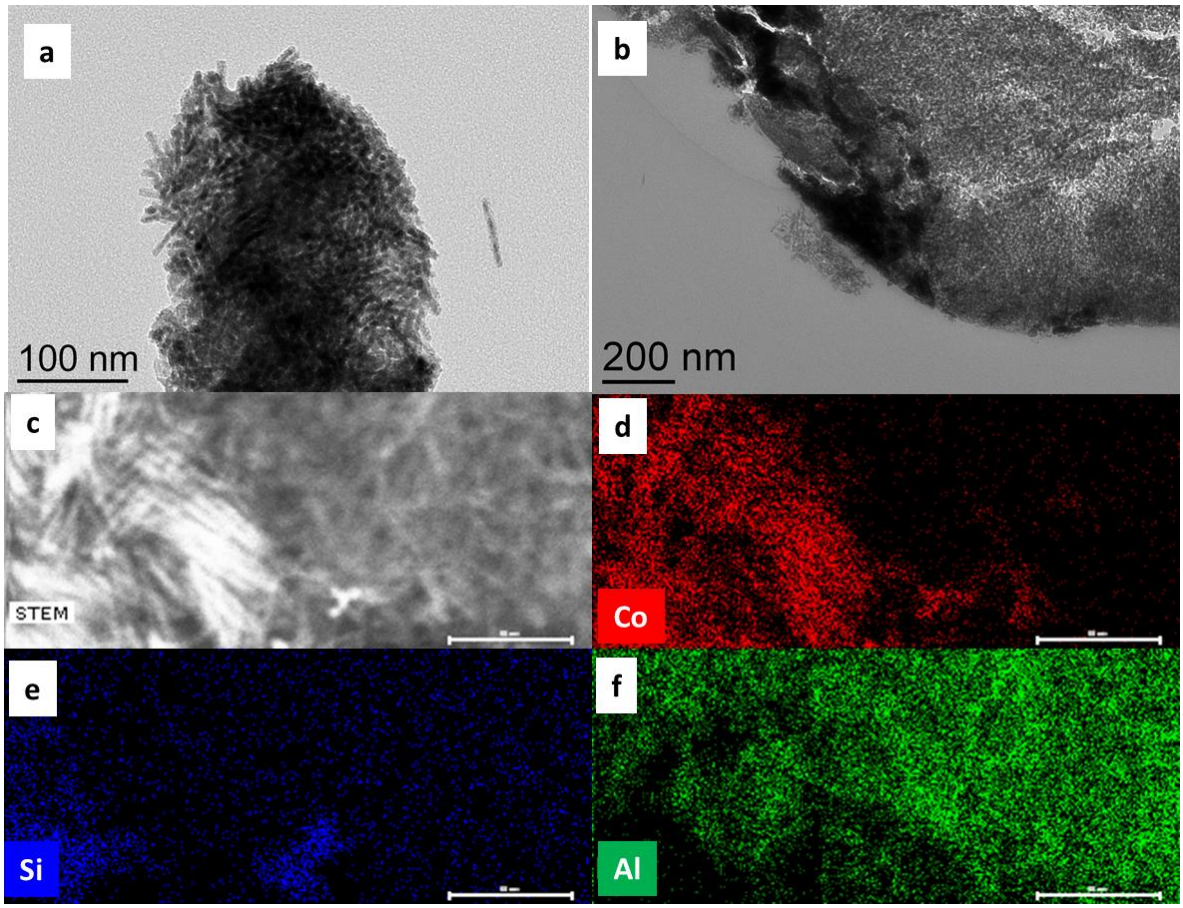

Figure SI-1. Impregnation of Al_2O_3-SiO_2 with preformed Co NRs. a) TEM, bTEM of a slice obtained by ultramicrotomy c f) STEM and EDX element distribution on a slice obtained by microtomy Co (red), Si (blue), Al (green). Scale bars a): 100 nm; b): 200 nm; c-f): 60 nm.

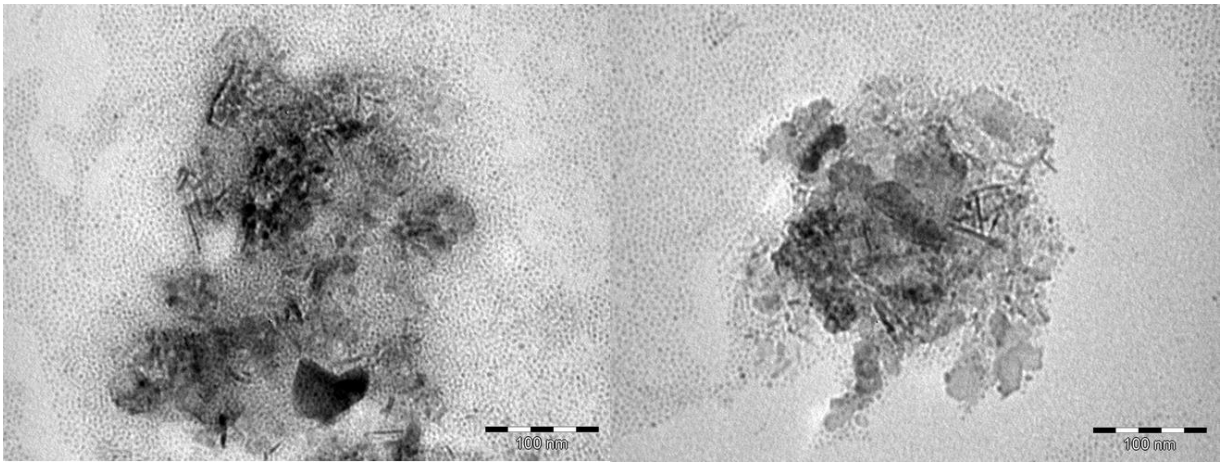

Figure SI-2. In situ reduction of Co NRs in the presence of Al_2O_3-SiO_2. TEM of a crude sample: nanorods and nanoparticles are formed in solution as well as on the support. Ill shaped nano-objects are also present on the support (scale bars = 100 nm).

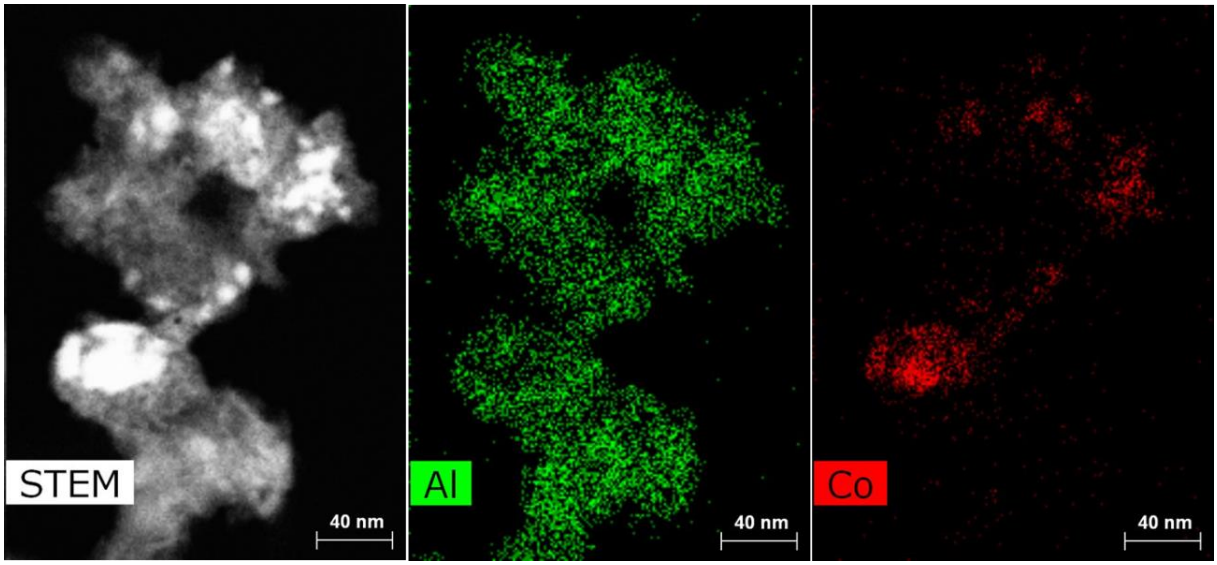

Figure SI-3. STEM-EDX of the 15% Co/Al_2O_3-SiO_2 catalyst (scale bars 40 nm).

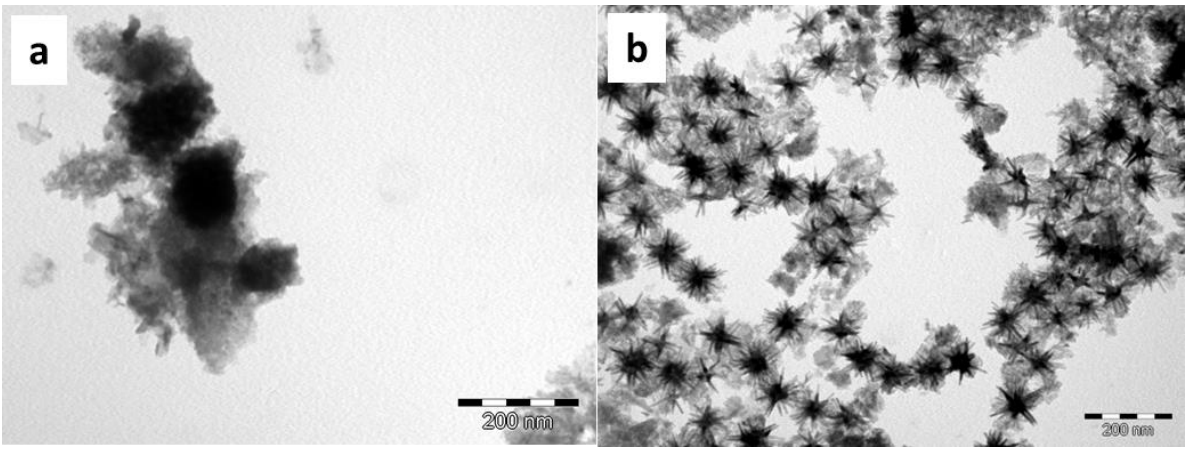

Figure SI-4. TEM of catalysts obtained by decomposition of $[Co\{N(SiMe_3)_2\}_2(thf)]$ on: a) 15% Co_3O_4/Al_2O_3-SiO_2; and b) 15% CoO/Al_2O_3-SiO_2. (scale bars 200 nm).

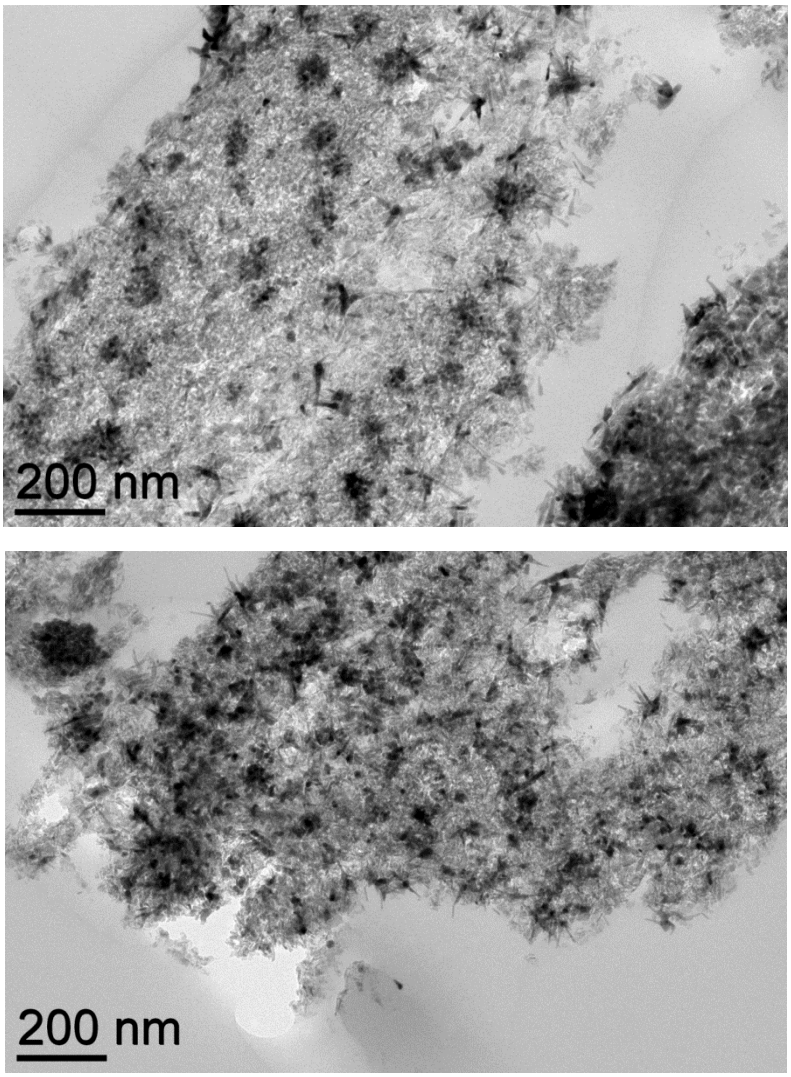

Figure SI-5. Co nano-objects obtained by decomposition of $[Co\{N(SiMe_3)_2\}_2(thf)]$ on a 8% Co/Al_2O_3-SiO_2 catalyst: TEM micrographs of samples obtained after ultra-microtomy.

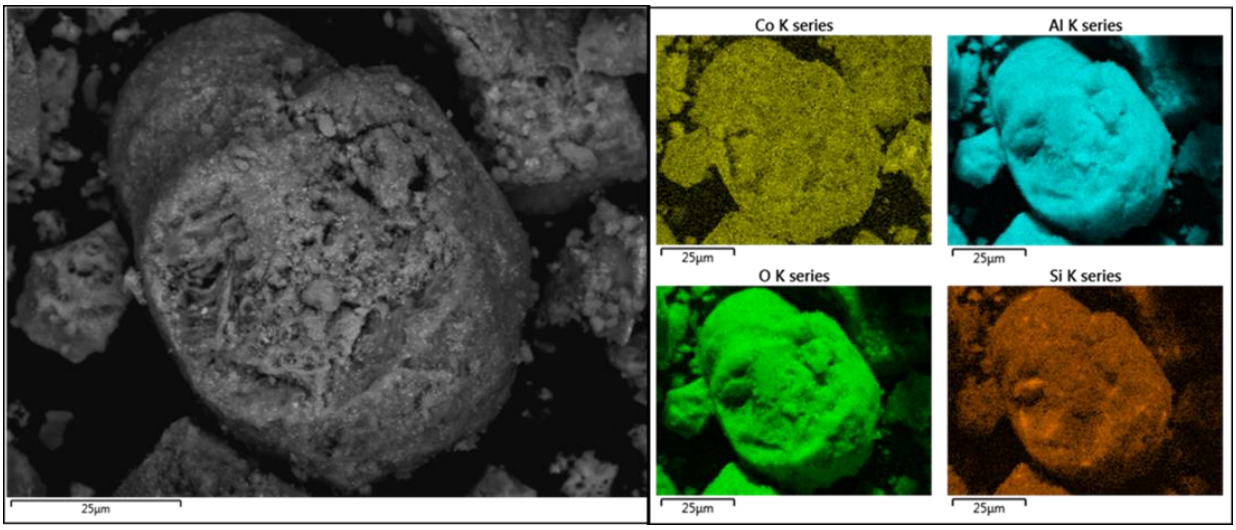

Figure SI-6. SEM-EDX of a 7%Co/8%Co/SiO_2-Al_2O_3 modified catalyst. The Co (yellow) is homogeneously distributed on the catalyst grain (scale bars 25 □m).

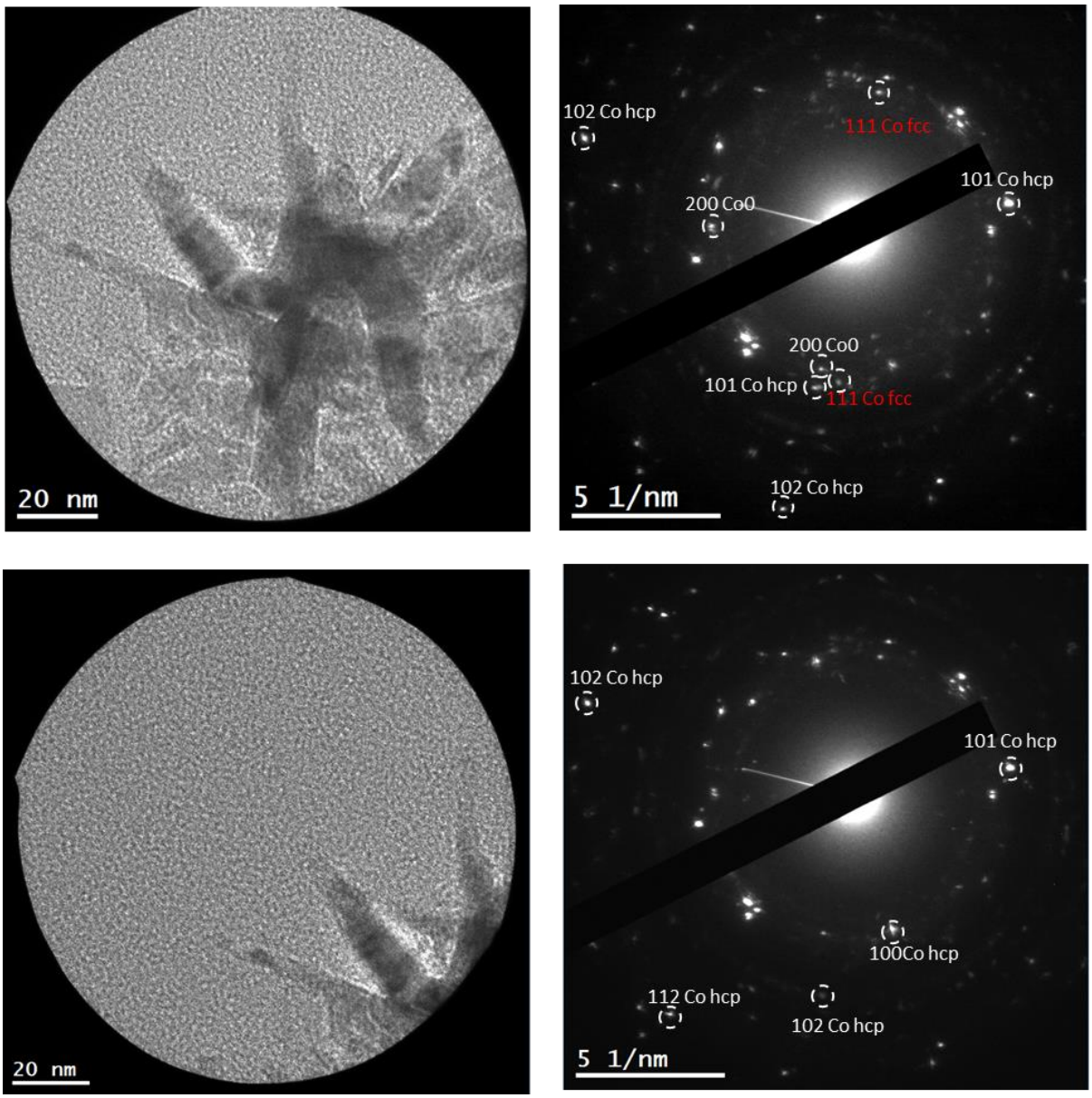

Figure SI-7. TEM of the 7%Co/8%Co/SiO_2-Al_2O_3.

Structural analysis of the Co nano-objects by selected area electron diffraction (SAED). Top: TEM image and corresponding diffraction pattern acquired on the whole individual nano-object (core and branches) showing the contribution of both hcp and fcc structures. Bottom: TEM image and corresponding diffraction pattern taken only on some branches of the same nano-object, illustrating in this case the predominant contribution of the hcp structure.

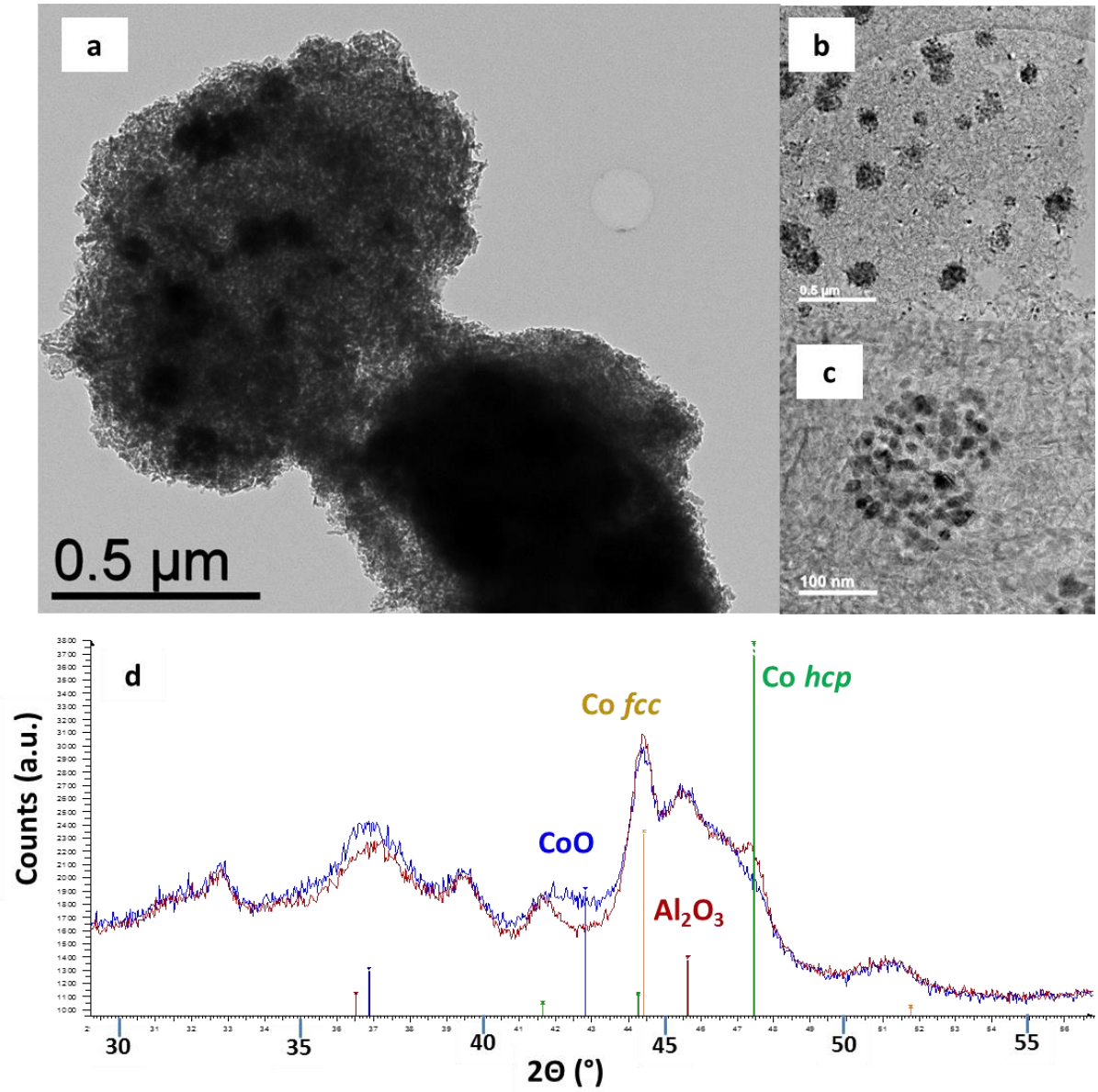

Figure SI-8. a) TEM of the 7%Co/8%Co/SiO_2-Al_2O_3 modified catalyst after 475 hours catalytic run, b-c) TEM of a sample obtained by ultramicrotomy in two magnifications (scale bars b: 500 nm, b: 100 nm). d) XRD: The blue diffractogram corresponds to the catalyst before use, the red to the used catalyst. The green lines correspond to the Co hcp, the yellow to the Co fcc the blue to CoO and the red to Al_2O_3.

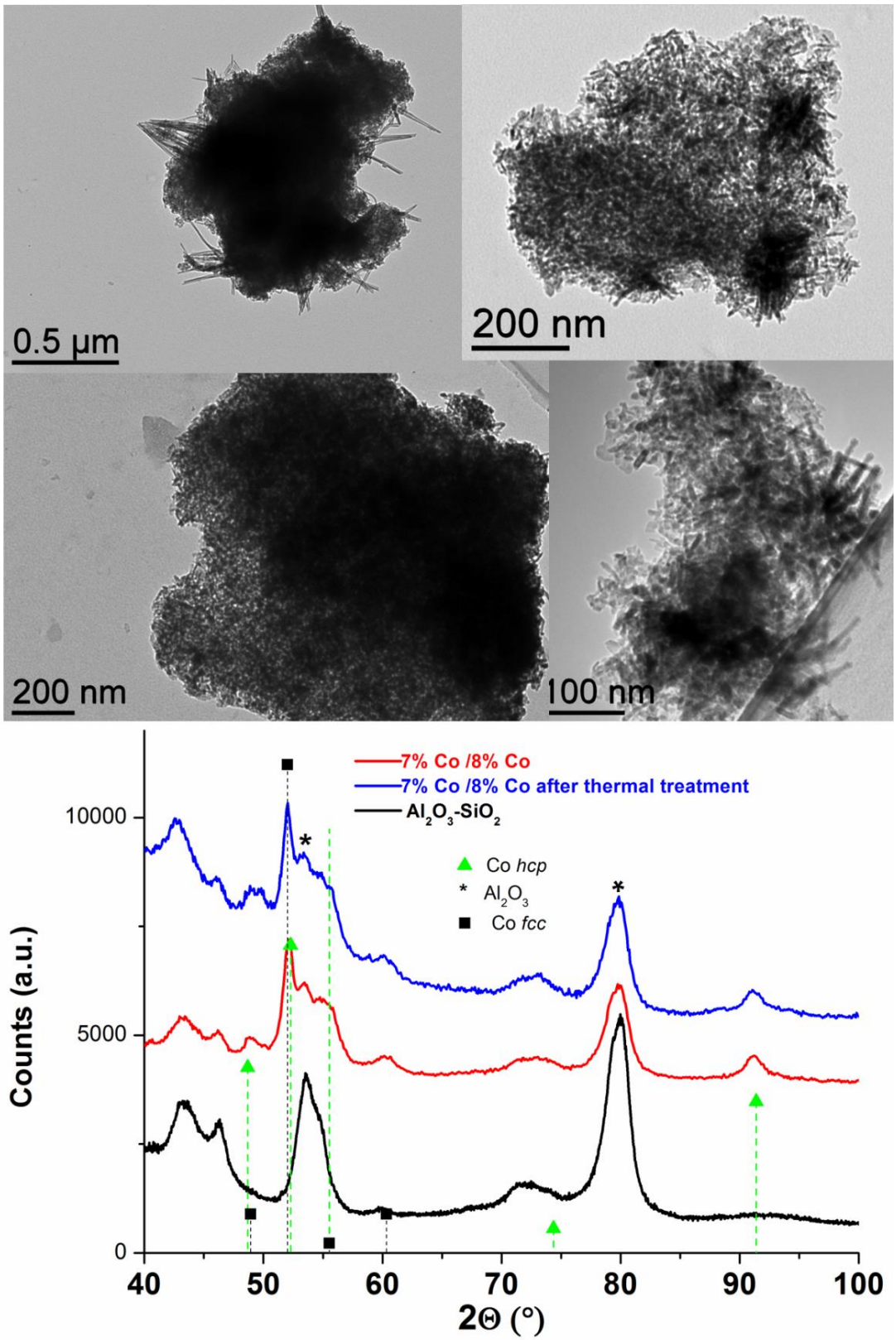

Figure SI-9. TEM micrographs after heat treatment of the 7%Co/8%Co/SiO_2-Al_2O_3 modified catalyst and XRD diffractograms of the SiO_2-Al_2O_3 support (black), and the 7%Co/8%Co/SiO_2-Al_2O_3 modified catalyst before (red) and after (blue) heat treatment.

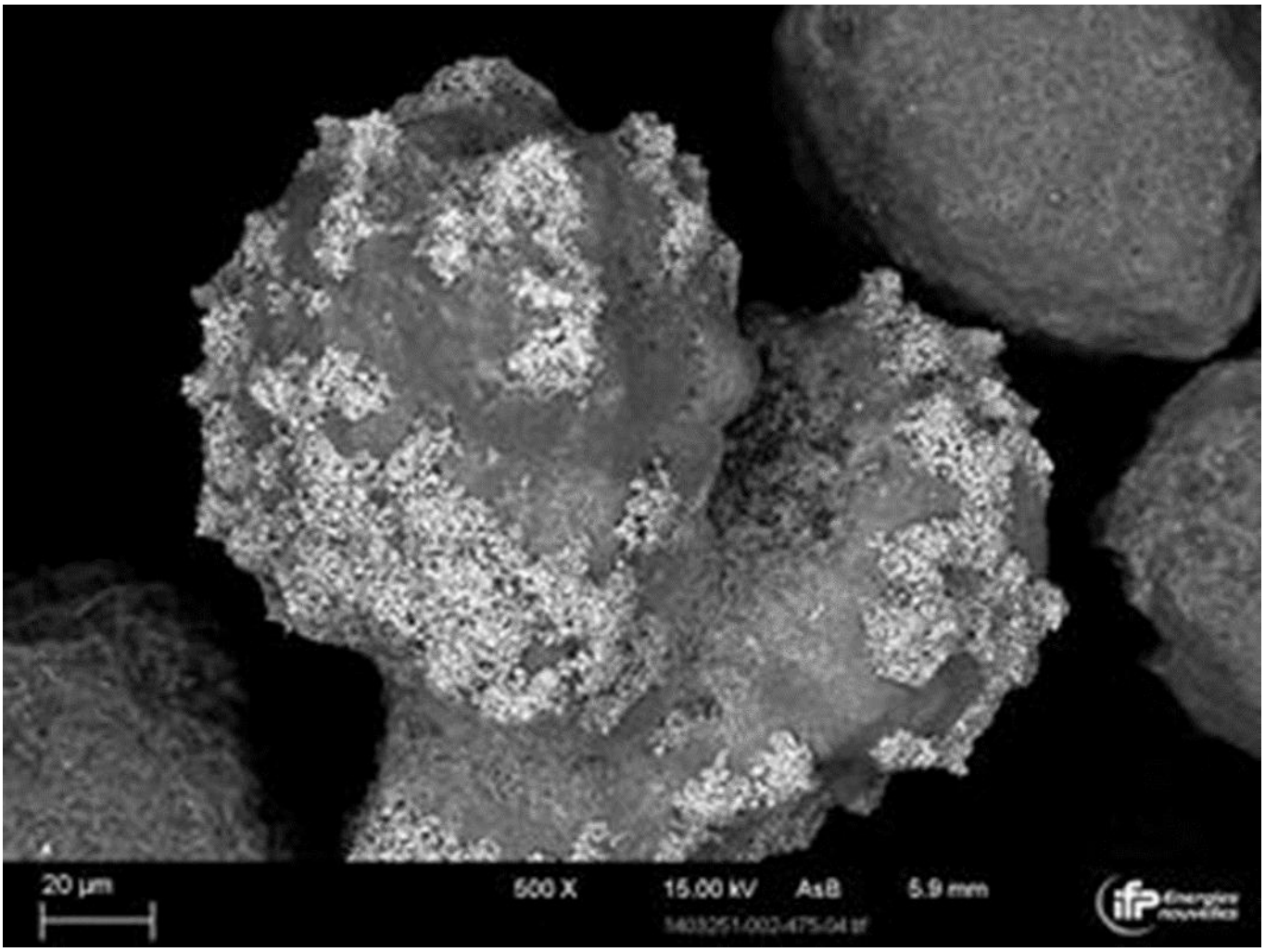

Figure SI-10. SEM micrograph of the used 15%Co- SiO2-Al2O3 reference catalyst after 300 h TOS, where Co is visibly extracted and sintered on the support grains.