

Exploring the size-dependency of cobalt particles in Fischer-Tropsch synthesis: Model catalyst preparation

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The Fischer-Tropsch synthesis (FTS) offers an appealing method for producing sustainable aviation fuels (SAF), making it a focal point for the CARE-O-SENE project, a German-South African project funded by BMBF (German Federal Ministry of Education and Research). In low-temperature FTS (LTFTS), cobalt catalysts are industrially utilised for the selective production of long-chain hydrocarbons (C₅₊) [1].

A titania-coated silica sphere support, produced via a hydrolysis reaction, is suggested to mimic the titania dispersions on an industrial alumina-based support, as reported elsewhere [2]. Cobalt nanoparticles, synthesised via a surfactant-free benzyl alcohol method [3], are ultrasonically deposited onto this model support, see Fig. 1. These are analysed and confirmed by SEM, TEM, HRTEM, STEM-EDS, XRD and Raman Spectroscopy.

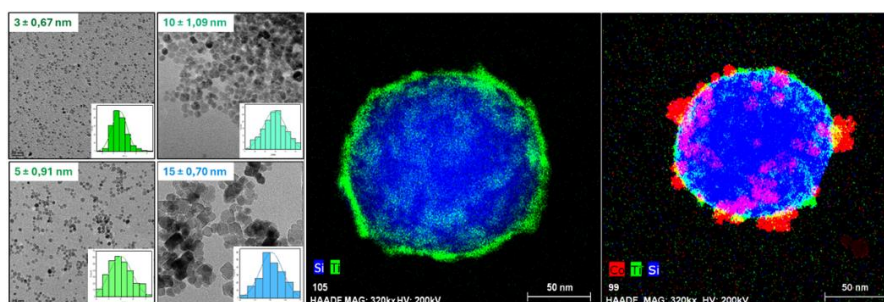


Figure 1. TEM micrographs of size-selected unsupported Co₃O₄ nanoparticles (left). STEM-EDS micrographs of 10 nm Co₃O₄ on 150 nm TiO₂-coated SiO₂ sphere (right).

References

- [1] CARE-O-SENE. <https://care-o-sene.com/en/care-o-sene/>, accessed 2024
- [2] Potgieter, J.H., Moodley, D., Botha, T., Visagie, J., Manong, T., Frank, M., Claeys, M., van Steen, E., Böltken, T. and Pfeifer, P., Catal. Today, 2024, 432, 114554.
- [3] Wolf, M., Fischer, N. and Claeys, M., 2018. Mater. Chem. Phys., 213, 305-312.