

### 3rd Workshop on the Simultaneous Combination of Spectroscopies with X-ray Absorption, Scattering and Diffraction Techniques



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## Fischer-Tropsch synthesis from biosyngas: Operando investigation of bimetallic cobalt-iron catalysts

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Biosyngas obtained from biomass gasification can be used to produce clean hydrocarbon fuels by Fischer-Tropsch reaction (FT). H<sub>2</sub>/CO ratio in biosyngas could be adjusted if water gas shift reaction may occur simultaneously with FT synthesis. Cobalt and iron bimetallic catalysts are active in these two reactions. The present work focuses on in-situ and operando studies of iron and cobalt phases in alumina or silica supported catalysts during catalyst activation and during FT synthesis using biosyngas. Bimetallic catalysts have better reducibility and higher dispersion compared with the monometallic ones. The presence of cobalt-iron alloys in the reduced activated catalysts was also confirmed using in-situ XRD and magnetism. Operando magnetization measurements during FT reaction are consistent with the formation of iron and possibly cobalt carbides during the catalytic tests. The operando XAS/XRD experiments with simultaneous measurements of catalytic activity under realistic conditions of FT reaction (H<sub>2</sub>/CO= 1, P=20 bar) suggest an enhanced stability of bimetallic catalysts to sintering compared to cobalt monometallic counterparts.

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