Synthesis of model cobalt catalysts for Fischer Tropsch Synthesis

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Abstract

Fischer Tropsch Synthesis is a catalytic process that converts *syn*gas (CO and H_2), which can be obtained from the biomass, into hydrocarbons and water. This process attracts a lot of attention as the petroleum resources are decreasing. Even though this process is known since 1923, the reaction mechanism and the deactivation process are still unclear. [1] Cobalt is currently one of the best adapted metals for the catalysis of this reaction since it presents an optimal trade-off between price and catalytic performance

The controlled decomposition of an organometallic cobalt precursor in the presence of stabilizing agents and by controlling of the reaction conditions allows the synthesis of size and the shape controlled Co nano-objects in solution. [2]
Based on these results we have developed new catalysts elaborated by cobalt overgrowth on pre-existing Co nano-particles of a conventional Fischer-Tropsch catalyst. Our method allows the growth of Co nanowires which starts from several sites of the surface of the pre-existing Co nano-particles leading to urchin-like shaped cobalt nano-objects embedded in the porosity of a silica-alumina support.

Preliminary results of the catalytic runs with this catalyst present a very high stability. The stability of the catalyst is a very important issue in the case of FTS catalysis, a lot of studies concern the deactivation phenomenon and the origin is still under debate.[3]

Another interest of this catalyst is that cobalt nanowires exhibit a *hcp* crystal structure. According to the literature, for Co FTS catalyst the *hcp* structure is more active than the *fcc one*.[4]

References

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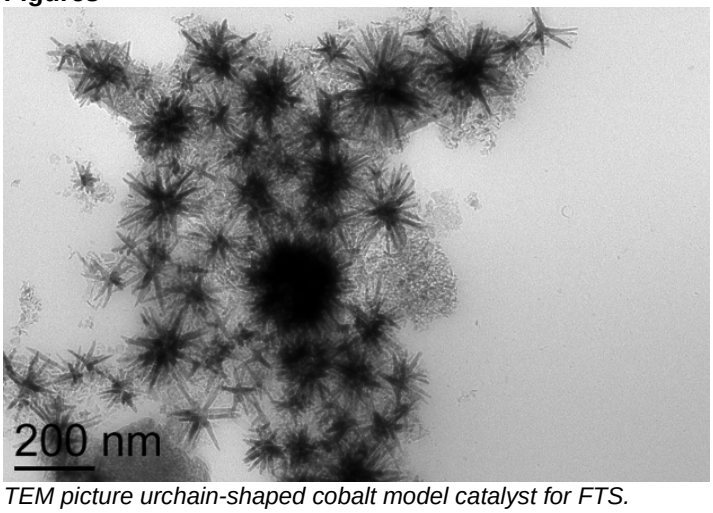
Figures



TEM picture urchain-shaped cobalt model catalyst for FTS.