Carbon-based catalysts used for Fischer-Tropsch synthesis

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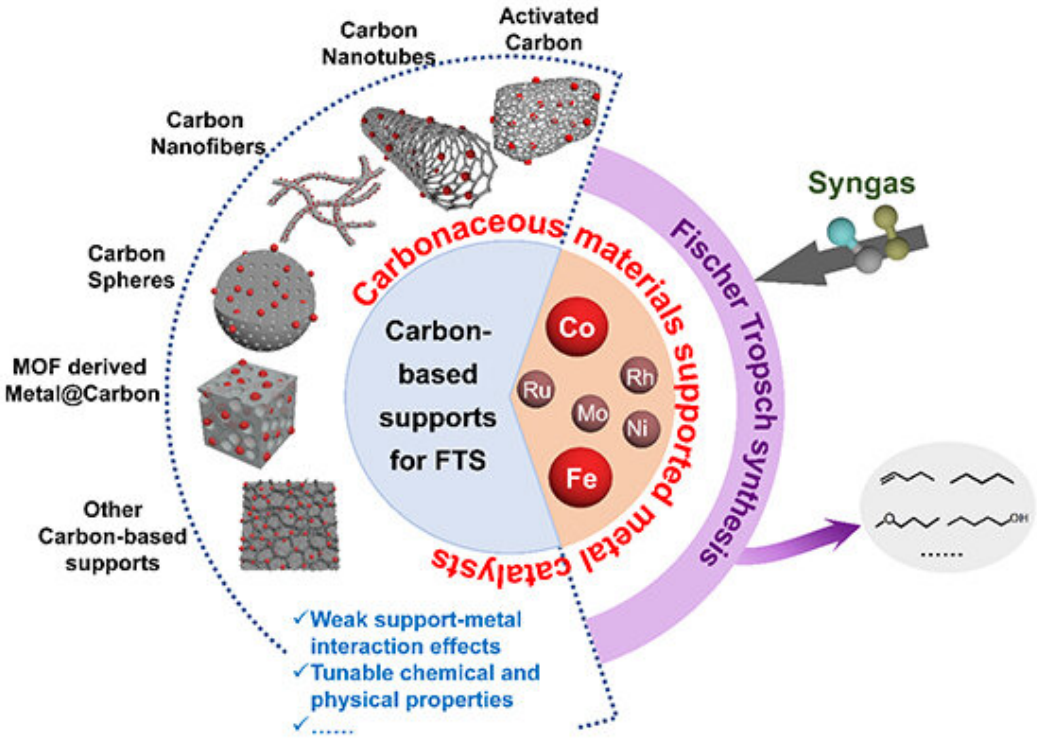

Carbonaceous materials supported metal catalysts for FTS. Credit: CHEN Yanping and WEI Jiatong

Fischer-Tropsch synthesis (FTS) is an essential approach to convert coal, biomass, and shale gas into fuels and chemicals, such as lower olefins, gasoline, and diesel.

Traditional support materials such as SiO_2, Al_2O_3 and TiO_2 have strong interactions with metal particles, affecting their catalytic activity. The inert surface of carbon-based materials can weaken the strong metal-support interaction and improve the reducibility of active metals, thereby enhancing the catalytic activity.

Recently, a research team led by Prof. Liu Jian from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences, in cooperation with Prof. Andrei Y. Khodakov from Unité de Catalyse et Chimie du Solide of Centre National de la Recherche Scientifique (UCCS, CNRS), reviewed the application of carbon-based catalysts for FTS.

The researchers summarized the substantial progress in the preparation of carbon-based catalysts for FTS by applying activated carbon (AC), carbon nanotubes (CNTs), carbon nanofibers (CNFs), carbon spheres (CSs), and metal-organic frameworks (MOFs) derived carbonaceous materials as supports.

"We want to provide critical and comprehensive progress regarding carbon-based catalysts for FTS for researchers to quickly obtain an overview of this area," said Prof. Liu.

They also discussed the current development about the application of carbon-based Co, Fe, and other metals (Mo, Ni, Rh, Ru) catalysts for FTS in detail, in terms of their special characteristics, as well as the comparison of catalytic performances of various carbon-based catalysts.

Carbon-based materials could serve as inert supports to adjust the interaction between the active phase and supports.

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More information: Yanping Chen et al. Carbon-based catalysts for Fischer–Tropsch synthesis, *Chemical Society Reviews* (2021). DOI: 10.1039/D0CS00905A

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