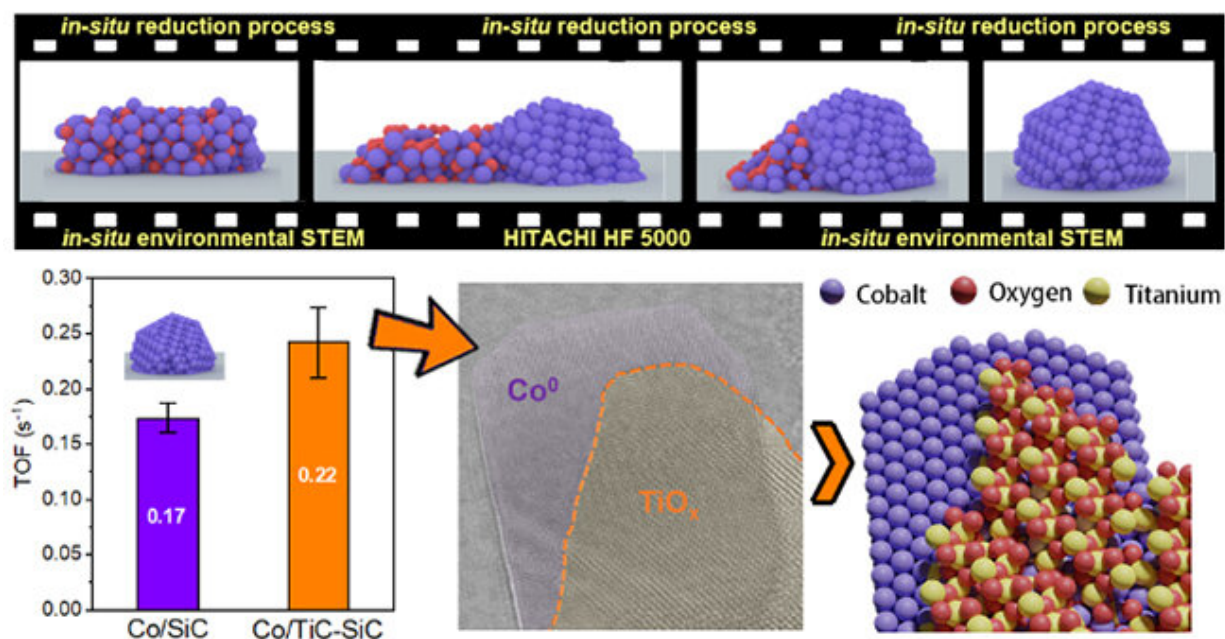


# Surface oxygenate species enhance cobalt-catalyzed Fischer-Tropsch synthesis

June 24 2021, by Li Yuan



The reduction process for cobalt species and the origin for the improved intrinsic activity. Credit: JIANG Qian

Carbide-supported metal catalysts are promising due to the special properties of metal carbide and the interactions between metals and the carbide supports. However, surface oxide species are inevitable in carbide materials, and their roles in metal-carbide interaction still remain unclear.

Recently, Assoc. Prof. LIU Yuefeng's group from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS), in collaboration with Prof. LIU Xi from Shanghai Jiao Tong University, observed the migration of  $\text{TiO}_x$  species to metallic cobalt surface during the reduction process employing the in situ environmental scanning transmission electron microscopy (ESTEM).

This work was published in *ACS Catalysis* on June 19.

Co/TiC-SiC catalysts presented higher Fischer-Tropsch Synthesis (FTS) activity than Co/SiC owing to the stronger [metal](#) support interaction that resulted in the better dispersion of Co NPs as well as the improved turnover frequency (TOF).

The researchers achieved direct structural observation at nanoscopic scale for the metal-support interaction and revealed that the migration of surface  $\text{TiO}_x$  species on the metallic active site significantly involved in the modulation of the interaction between metal and TiC substrate.

The formation of Co- $\text{TiO}_x$ -TiC heterojunction structure over Co/TiC-SiC [catalyst](#) not only benefited the dispersion of Co NPs, but also rendered the superior intrinsic FTS activity.

"This work paves the way for the future rational design of advanced catalysts through moderate metal-support interaction by employing [surface](#) oxide species on carbide materials," said Prof. LIU.

**More information:** Qian Jiang et al, Surface Oxygenate Species on TiC Reinforce Cobalt-Catalyzed Fischer-Tropsch Synthesis, *ACS Catalysis* (2021). [DOI: 10.1021/acscatal.1c00150](https://doi.org/10.1021/acscatal.1c00150)

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