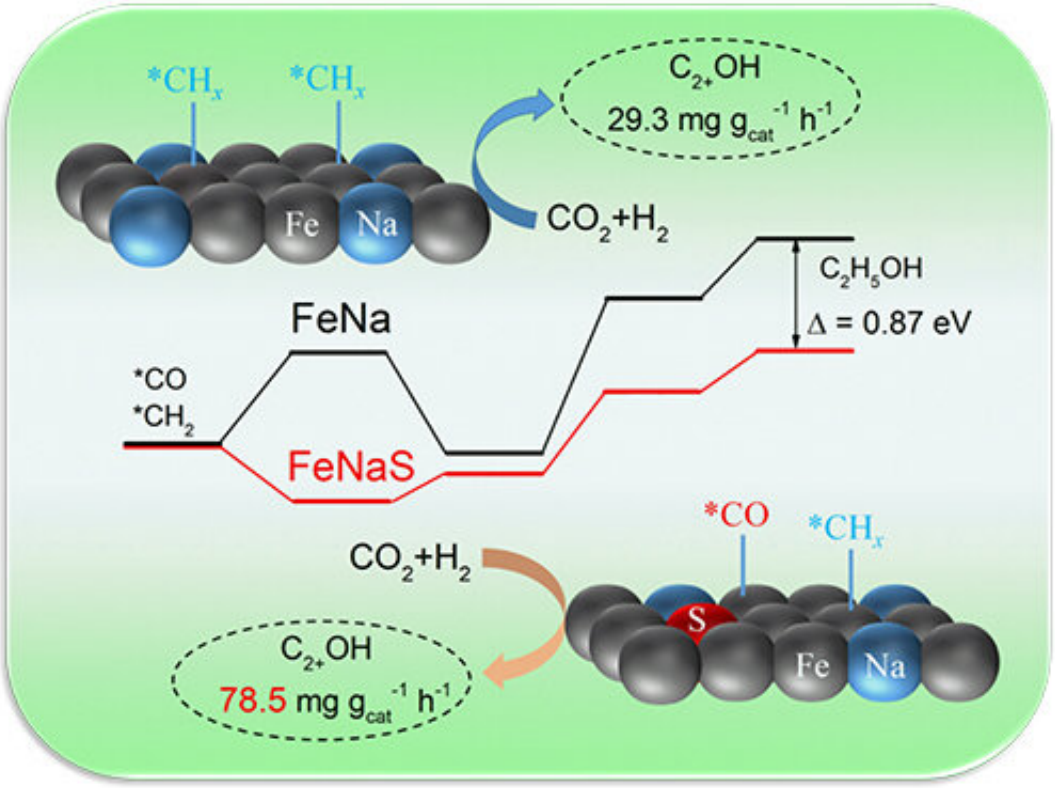
Novel iron-based catalyst boosts conversion of CO2 to higher alcohols

August 17 2021, by Li Yuan



Revealing the promoting role of S in higher alcohols synthesis over iron catalysts. Credit: YAO Ruwei

Higher alcohols ($C_{2+}OH$), important intermediates for fine chemicals, are mainly produced via petrochemical route, which is energy-intensive and environmentally unfriendly.

Recently, a research team led by Prof. Sun Jian and Prof. Ge Qingjie from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS) proposed a monometallic iron catalyst with Na and S co-modification for higher alcohols synthesis from CO_2 hydrogenation.

This study was published in *Applied Catalysis B: Environmental* on July 28.

Iron is a well-known candidate catalyst for CO_2 conversion. However, the strong ability for CO dissociation of the monometallic iron catalyst decreases the efficiency of higher alcohols synthesis.

The proposed monometallic iron catalyst achieved a space-time yield of 78.5 mg g_{cat}^{-1} h^{-1} for C_{2+} alcohols at a relatively mild condition, which was comparable to the composite catalysts such as FeCu and FeRh.

The synergistic effects of Na and S enabled the Fe sites in different electronic environment in one metal phase and helped provide matched dissociative and non-dissociative CO activation simultaneously required for higher alcohols synthesis.

More information: Ruwei Yao et al, Monometallic iron catalysts with synergistic Na and S for higher alcohols synthesis via CO_2 hydrogenation, *Applied Catalysis B: Environmental* (2021). DOI: 10.1016/j.apcatb.2021.120556

Provided by Chinese Academy of Sciences

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