Direct production of olefins from syngas with ultrahigh carbon efficiency

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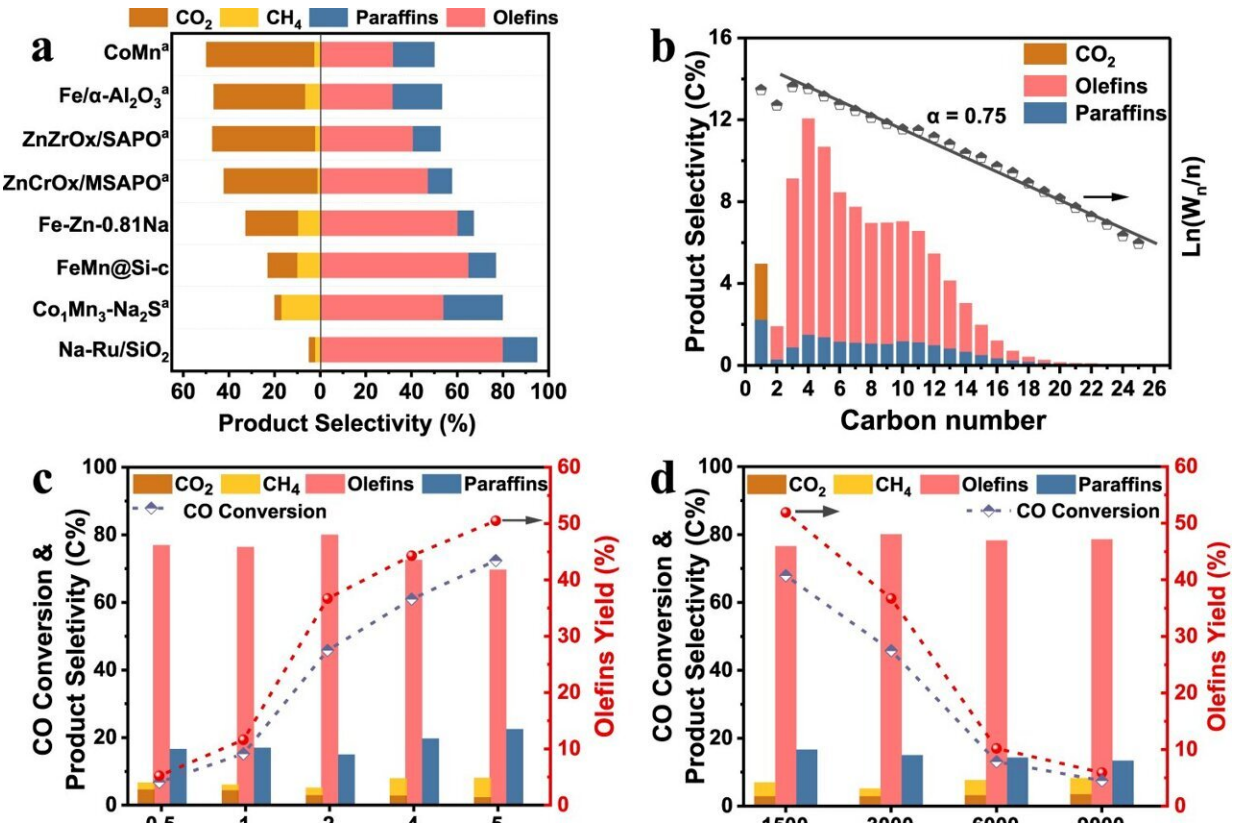

Catalytic performance for direct syngas conversion to olefins. a Comparison of catalytic performance among Na-Ru/SiO_2 and other previously reported catalysts. (a: C_{2-4}= selectivity). b Detailed product distribution (including CO_2) and ASF distribution of hydrocarbons over Na-Ru/SiO_2 catalyst. c Product selectivity, CO conversion and olefins yield at different H_2/CO ratios in syngas over Na-Ru/SiO_2 catalyst at 533 K, 3000 mL·$g_{cat.}^{-1}$·h^{-1}, and 1.0 MPa. d Product selectivity, CO conversion and olefins yield at different space velocities over Na-Ru/SiO_2 catalyst at 533 K, H_2/CO ratio of 2 and 1.0 MPa. e Stability test for

Na-2%Ru(P)/SiO_2 catalyst. f Reaction rate of CO and product selectivity at different Na/Ru molar ratios. Reaction conditions: 533 K, 1.0 MPa, 3000 $mL \cdot g_{cat.}^{-1} \cdot h^{-1}$, H_2/CO ratio of 2. Credit: *Nature Communications* (2022). DOI: 10.1038/s41467-022-33715-w

Olefins are key building blocks to manufacture a wide range of value-added products such as polymers, lubricants, plasticizers, drugs, detergent and cosmetics.

Syngas conversion serves as a competitive strategy to produce olefins from nonpetroleum resources. However, the goal to achieve desirable olefins selectivity with limited undesired C1 by-products remains challenging.

Recently, a research team led by Prof. Zhong Liangshu from the Shanghai Advanced Research Institute (SARI) of the Chinese Academy of Sciences has reported a non-classical Fischer-Tropsch to olefins (FTO) process, which can realize 80.1% olefins selectivity with ultralow total selectivity of CH_4 and CO_2 (