Cobalt Ferrite as Efficient Bimetallic Catalyst Precursor for CO2 hydrogenation to light olefins

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Among the various CCU technologies, catalytic hydrogenation of CO_2 to light olefins has attracted attention to reduce the amount of CO_2 and selectively produce light olefins. CO_2-FT route is one of the route of catalytic hydrogenation of CO_2 which involves two successive reactions, RWGS and FTS. Fe-based catalysts have traditionally been the most widely used as a CO_2 hydrogenation catalyst, because of their high activity in RWGS and FTS reactions. Here we report that the homogenously distributed cobalt and iron bimetallic catalyst for efficient light olefin production by using $CoFe_2O_4$ nanoparticle precursor. Sodium promoted and unpromoted nanoparticles(Fe_3O_4, $CoFe_2O_4$,Co) are synthesized by oleate mediated thermal decomposition method. Synthesized nanoparticle supported on the carbon nanotube and tested at 340°C, 10 bar. In unpromoted and Na-promoted samples, $CoFe_2O_4$ shows much higher light olefin selectivity compare to other samples. Especially,Na-CoFe2O4 precursor shows the synergistic effect of uniformly distributed Co on Hagg iron carbide(Fe_5C_2) leads to a high carbon dioxide conversion and light olefin selectivity.