

## Fischer-Tropsch synthesis over supported cobalt oxide nanocrystals

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To investigate the crystal size effects in the Fischer-Tropsch synthesis (FTS), cobalt oxide nanocrystals with particle sizes of 2nm to 15nm were synthesized using oleic acid as a capping agent and the supported catalysts of 5wt% Co/Al<sub>2</sub>O<sub>3</sub> were prepared by the impregnation of  $\gamma$ -alumina with the colloidal solution of the nanocrystalline cobalt oxide. The synthesized nanocrystals and the supported catalysts were characterized using XRD, TEM, TPR, O<sub>2</sub> titration, and H<sub>2</sub> chemisorption. The FTS performances of the catalysts were examined in a fixed bed reactor. The catalytic properties such as activity and selectivity were mainly dependent on the cobalt crystal size. In the point of views of high CO conversion and selectivity toward C<sub>5</sub>+ hydrocarbons, and low conversion to CO<sub>2</sub> and CH<sub>4</sub>, best results were obtained in the supported catalyst with 7 nm cobalt oxides. Furthermore the nanocrystal-loaded Co/Al<sub>2</sub>O<sub>3</sub> exhibited much higher CO conversion and C<sub>5</sub>+ selectivity than catalysts prepared by conventional method (impregnation and precipitation).