

Enhanced catalytic stability of Al₂O₃ modified ordered-mesoporous Co₃O₄ for Fischer-Tropsch synthesis: Effect of Al₂O₃ content

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The Al₂O₃-modified ordered mesoporous Co₃O₄ catalysts (meso-Co₃O₄) were investigated for the Fischer-Tropsch synthesis (FTS) reaction to obtain a higher catalytic stability and activity by varying the ratio of Al₂O₃/Co₃O₄ from 0 to 15wt%. At an optimal content of Al₂O₃ pillaring material, a high CO conversion and stability were observed compared to the bare mesoporous Co₃O₄. The Al₂O₃/meso-Co₃O₄ catalyst having a 5wt% Al₂O₃ showed a superior catalytic stability and activity due to a significantly increased structural stability with the help of the strongly interacted Al₂O₃ modifier in the Co₃O₄ mesopores even under reductive reaction condition. The different deactivation patterns according to the Al₂O₃ content on the meso-Co₃O₄ were explained using the results of XRD, TPR, BET and XAFS analysis.