

Direct dimethyl ether(DME) synthesis from syngas using ordered mesoporous alumina: Effect of calcination temperature of supports

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Dimethyl ether (DME), which has similar physical properties with LPG, is one of the attractive alternative fuels because of a lower emission of air-pollutants than that of the traditional diesel fuel. The direct synthesis of DME from syngas was investigated on the Cu supported on the mesoporous Al₂O₃ (Cu/mesoAl) to verify the regular mesopores to the catalytic stability. The mesoporous Al₂O₃ was synthesized by the EISA (Evaporation Induced Self Assembly) and it was annealed at different temperatures for changing its physicochemical properties and acidic properties. The copper was loaded 10wt% based on the total weight of Al₂O₃ by incipient wetness impregnation method. The SAXS analysis indicated that the annealing temperature of mesoporous Al₂O₃ was critical factor to change ordered regularity of alumina and the selectivity to DME was inversely related with the pore sizes of Al₂O₃. H₂-TPR, XRD, NH₃-TPD, N₂-physisorption, N₂O titration, and XPS were used to characterize the hybrid Cu/mesoAl catalysts.