Methanation on mass-selected Ru nanoparticles on a planar SiO2 model support: The importance of under-coordinated sites

Mass-selected Ru nanoparticles were deposited onto planar SiO2 support and their capability for the methanation reaction investigated. The catalytic activity for the methanation reaction at 100mbar under hydrogen rich conditions (1:99 CO/H2 ratio) was measured as a function of particle size. We found that the Turnover Frequency increased with nanoparticle diameter in the range 4–10nm. As the TOF decreases over reaction repetition, we investigated the possible reasons and ruled out carbon deposition as a cause for activity loss. As no particle sintering was observed, we invoked surface restructuring as a possible cause.

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