Title:	Influence of support textural property on CO2 to methane activity of Ni/SiO2 catalysts
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Abstract:	In this work, we elucidated the role of physicochemical textural properties of inert support on the catalyst activity by impregnating Ni on ordered mesoporous silica (SBA-15 and MCM-41) and non-mesoporous silica (nMPS). The catalyst Ni/SBA-15 exhibited the best CO2 conversion (83%) and product selectivity (99.9 %) followed by Ni/MCM-41 and the least by Ni/nMPS. The difference in the nature of the catalyst, degree of nanoparticle distribution and nanoparticle encapsulation by different silica support were studied by N2 adsorption-desorption and X-ray photoelectron spectroscopy (XPS) experiments. The Operando Diffused Reflectance Infrared Fourier Transform Spectroscopy were used to understand the variance in reaction pathway which is accredited to the textural properties of the support. The SBA-15 supported Ni catalyst followed dissociative CO pathway while MCM-41 and nMPS reacted through associative formate mechanism as major pathway. These findings provide a novel perspective on CO2 hydrogenation over Ni-silica, allowing us to tune both activity and selectivity.
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