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RESEARCH ARTICLE

Stability of Ni/SiO_2-ZrO_2 catalysts towards steaming and coking in the dry reforming of methane with carbon dioxide

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Supporting Information

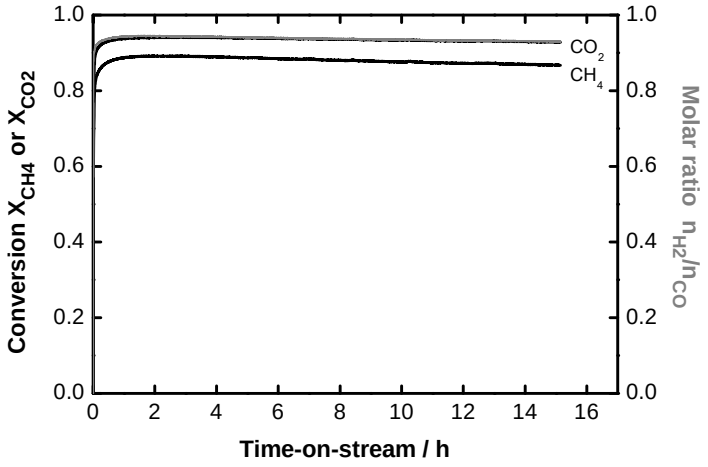

Fig. 1S CH_4 and CO_2 conversion as well as molar ratio n_{H2}/n_{CO} as a function of time-on-stream in the DRM over Pt/ZrO_2 (T = 850 °C, GHSV = 6.0×10^3 h^{-1}, $n_{CH4}/n_{CO2}/n_{Ar}$ = 47.5/47.5/5.0).

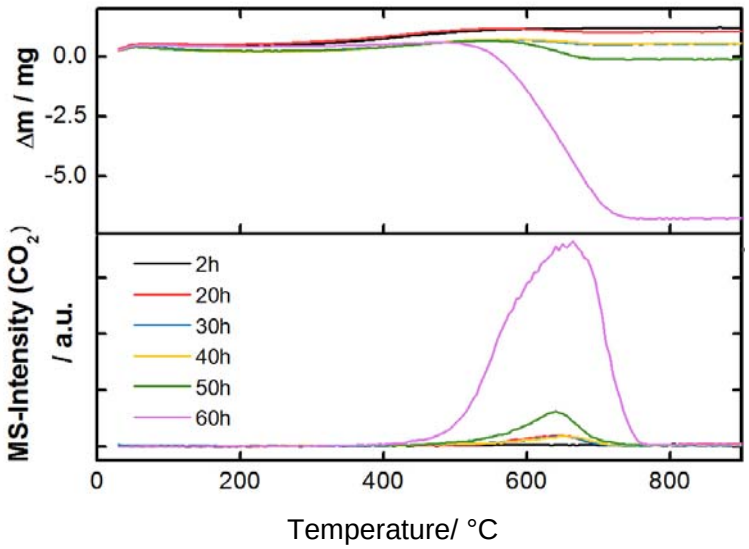

Fig. 2S TGA-profiles (top) and MS-intensity for CO_2 (bottom) during TGA for 5Ni/SiO_2-ZrO_2 (batch 1) after DRM for different times-on-stream (T = 850 °C, GHSV = 1.8×10^3 h^{-1}, n_{CH4}/n_{CO2} = 1/1).

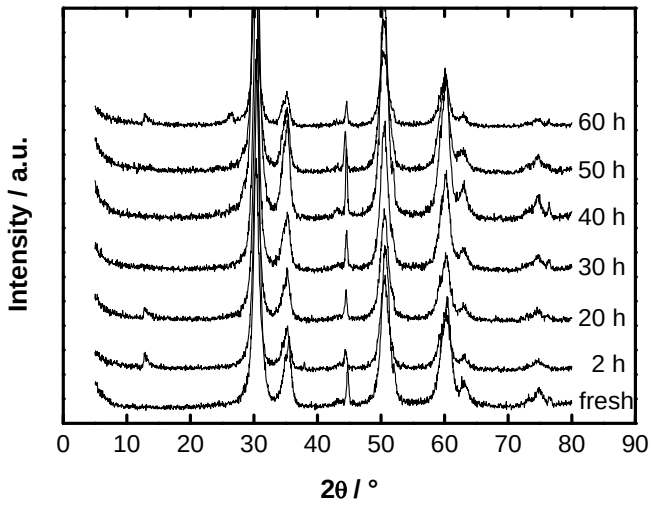

Fig. 3S PXRD patterns of 5Ni/SiO_2-ZrO_2 (batch 1) before (fresh) and after different times-on-stream in DRM (T = 850 °C, GHSV = 1.8×10^3 h^{-1}, n_{CH4}/n_{CO2} = 1/1).

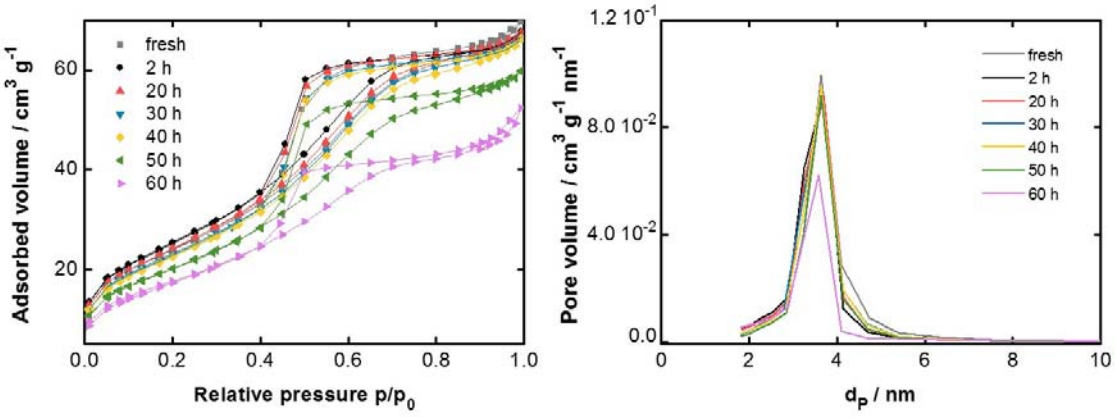

Fig. 4S N_2-Sorption isotherms (left) and pore width distribution (from the desorption branch of the isotherms; right) of 5Ni/SiO_2-ZrO_2 (batch 1) before (fresh) and after different times-on-stream in DRM (T = 850 °C, GHSV = 1.8×10^3 h^{-1}, n_{CH4}/n_{CO2} = 1/1).

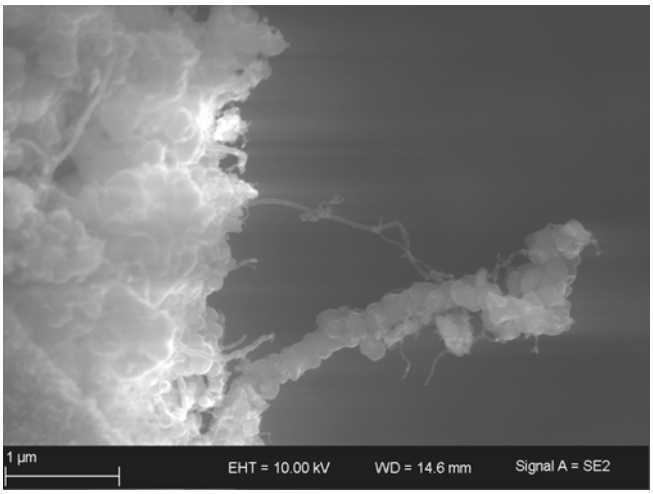

Fig. 5S SEM image of 5Ni/SiO_2-ZrO_2 (batch 1) after 60 h on-stream in DRM (T = 850 °C, GHSV = 1.8×10^3 h^{-1}, n_{CH4}/n_{CO2} = 1/1).

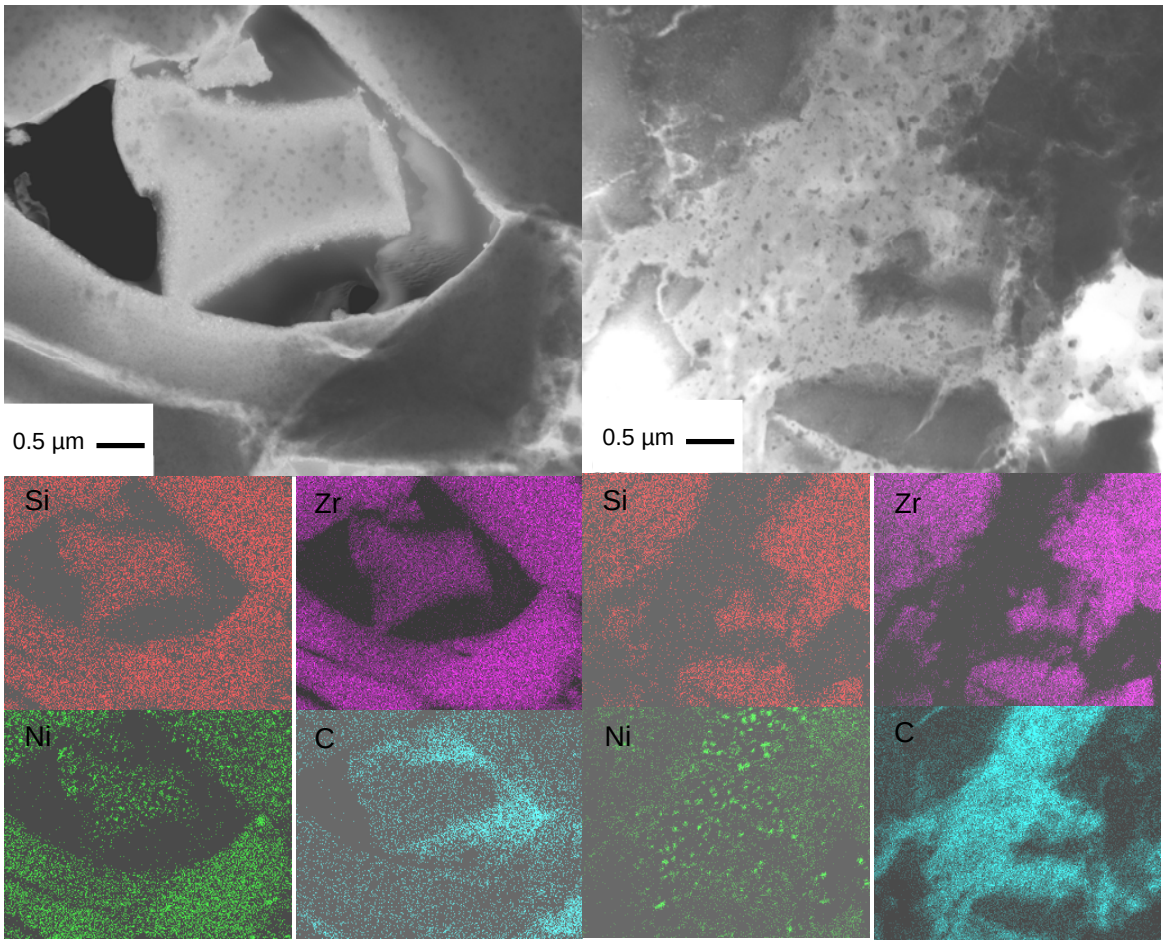

Fig. 6S STEM dark-field image of 5Ni/SiO_2-ZrO_2 (batch 1) after 2 h on-stream (left) and bright-field image of 5Ni/SiO_2-ZrO_2 (batch1) after 60 h on-stream in DRM (T = 850 °C, GHSV = 1.8×10^3 h^{-1}, n_{CH4}/n_{CO2} = 1/1). The bottom part shows EDX maps of the same image areas for Si, Zr, Ni and C.

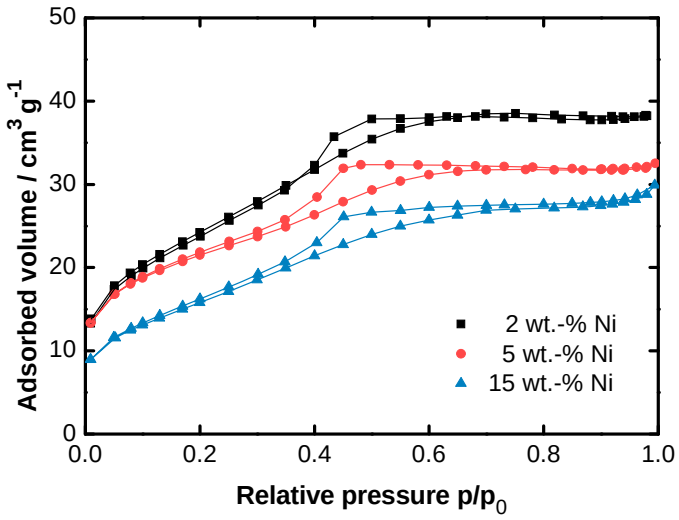

Fig. 7S N_2-Sorption isotherms of Ni/SiO_2-ZrO_2 (batch 2; fresh) with different Ni loadings.

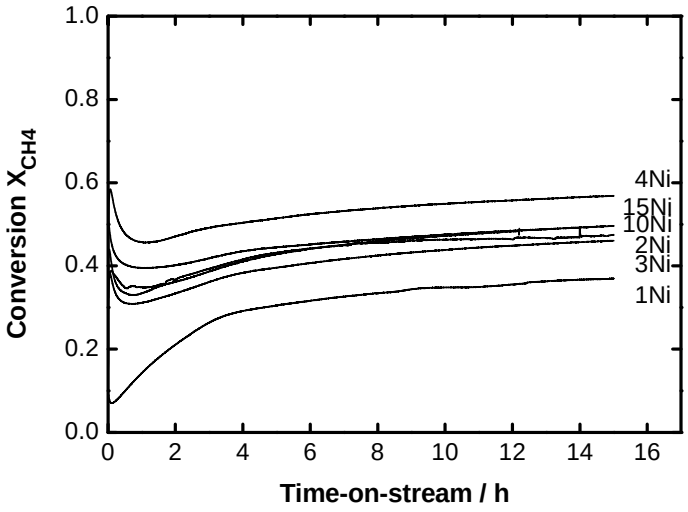

Fig. 8S CH_4 conversion as a function of time-on-stream in the DRM over Ni/SiO_2-ZrO_2 (batch 2) with different Ni loadings (T = 850 °C, GHSV = 6.0×10^3 h^{-1}, $n_{CH_4}/n_{CO2}/n_{Ar}$ = 47.5/47.5/5.0).