

Influence of preparation conditions on catalytic performance of Ni-MgO/ γ -Al₂O₃ catalyst for selective CO methanation

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Selective CO methanation in the presence of CO₂ and H₂ is an efficient strategy for CO removal, maintaining its concentration below 10 ppm in the reformat of a fuel processor for polymer electrolyte membrane fuel cells (PEMFC). To develop selective CO methanation catalysts performing above the desirable level in wide range of operating temperature, the high dispersion of the catalytic active sites is one of the most relevant factors. Thus, we have prepared Ni-MgO/ γ -Al₂O₃ catalysts by deposition-precipitation methods varying precipitation pH and calcination temperatures for improving the dispersion of the Ni particles. The catalysts prepared under the different conditions have been characterized by X-ray diffraction, temperature-programmed reduction and H₂ chemisorption. The influence of the preparation conditions on the performance of the prepared catalysts have been investigated over a wide temperature range 230 °C to 350 °C while maintaining a space velocity of 60,000 mL/h•g_{cat} and the results have been compared with commercial Ni-based CO methanation catalysts.