

Development of Co-CeO₂ catalyst for high temperature water-gas shift reaction

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Co-CeO₂ catalyst prepared by co-precipitation method was applied in high temperature water-gas shift (HT-WGS) reaction. The catalyst showed stable activity performance at 400 °C with 90% CO conversion without any side reaction (methanation) at a very high GHSV of 143,000 h⁻¹, which is the highest value reported for the HT-WGS reaction. Superior reducible nature of ceria support and the preferential exposure of (220) and (112) facets of CeO₂ and Co₃O₄ were responsible for the remarkable performance of the prepared catalyst. The time-on-stream study result substantiates that ceria stabilizes the surface area of Co-CeO₂ catalyst during the WGS reaction compared to the bulk Co₃O₄.