

Ordered mesoporous mixed metal oxide catalysts for CO preferential oxidation in H₂-rich gases

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The preferential oxidation (PrOx) reaction is an efficient way to purify hydrogen produced by steam reforming of hydrocarbons and alcohols for application in proton exchange membrane fuel cell (PEMFC) for the removal of carbon monoxide, since the presence of CO impedes the H₂/O₂ reaction by the anode absorption of CO and the consequent poisoning. Optimum fuel cell efficiency requires complete removal of CO (< 10 ppm) from the hydrogen-rich gas feed.

Generally for PrOx, supported noble metal alloy catalysts, based on Ru and Pt, are currently the benchmark systems. However, as a noble metal-free alternative, the Cu-Ce-O system is a promising candidate, thanks to its low cost and high selectivity.

In this work, a series of mesoporous mixed metal oxide catalysts prepared by nano-replication method was evaluated in the PrOx reaction. The structure of the catalysts were characterized using powder X-ray diffraction (XRD), nitrogen adsorption & desorption isotherms, Raman spectrums, scanning electron microscopy (SEM), temperature programmed study experiments.