

## Ni Catalyst Washcoated on Metal Monolith with Enhanced Heat-transfer Capability for Steam Reforming

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A commercial Ni-based catalyst was washcoated on a monolith made of 50 $\mu$ m-thick fecralloy plates. Compared with the same volume of coarsely powdered Ni catalysts, the monolith-washcoated Ni catalysts showed a higher methane conversion in the steam reforming reaction, especially at gas hourly space velocities (GHSV) higher than 28000 h<sup>-1</sup>, and with no pressure drop. A higher conversion of the monolith catalyst was obtained, even though it contained a lower amount of active catalyst (3 g of the washcoated Ni catalyst vs. 17 g of the powdered catalyst), indicating that the heat transfer capability of the Ni catalyst was significantly enhanced by the use of a metal monolith. The efficacy of the monolith catalyst was tested using a shell-and-tube type heat exchanger reactor, using 912 cc of the monolith catalyst charged onto the tube side, with hot combusted gas supplied to the shell side in the counter-current direction to the reactant flow. A methane conversion higher than 94% was obtained at a GHSV of 7300 h<sup>-1</sup> and average temperature of 640°C.