

Steam-CO₂-Reforming of methane over doped ceria promoted Ni/MgO-MgAl₂O₄ structural catalyst

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Steam-CO₂-Reforming of methane (SCR) produces syngas using both carbon dioxide which is main source of greenhouse effect and methane, main compound of natural gas. The SCR has been applied to various fields such as production of gasoline and diesel from Fischer-Tropsch synthesis, production of methanol and hydrogen. Nickel is one of the best promising metals in SCR because having high catalytic activity and it is much less expensive than any other noble metals. Regardless of those advantages, nickel catalysts have critical defects that can be deactivated by coke deposition and sintering of catalyst particles at high temperatures. To prevent deactivation, there are several approaches to downsizing of nickel particles to nano-size or using alkaline earth metals or rare-earth metals as a promotor. In promoter studies, ceria is one of the best candidate materials, which has basicity and high oxygen storage capacity to prevent coke. However, the ceria is usually hard to apply to structural catalysts because it leads to degrade thermal and mechanical stability. Thus, we focused on catalytic performances of Ni/MgO-MgAl₂O₄ structural catalysts promoted by doped ceria to prevent coke.