Combined steam reforming of CH_4 and CO_2 on the transition metal(M)-incorporated LaNiMOx perovskite catalysts

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Combined steam reforming of CH4 and CO2 has been largely studied to produce syngas having a poper molar ratio of H2/CO for applying to Fischer-Tropsch syntheis and fuel cell. In recent, perovskite materials have been enormously investigated for reforming reaction due to the low aggregation of nickel crystallites at high temperatures. We have studied nikel containing perovskite catalysts of La0.09Ni0.1M0.01Ox (M=Fe, Co, Ce, Sr) which are prepared by co-precipitation methiod on Al2O3 support. The weight of Ni content in perovskite material to Al2O3 is fixed to around 12wt% and the reaction was carried out at feed molar composition of CH4/CO2/H2O = 1/0.35/1.5. The La0.09Ni0.1Sr0.01Ox catalyst is found to be most stable and to show higher activity at all tested temperature ranges of 750 - 850oC. The observed superior catalytic stability on La0.09Ni0.1Sr0.01Ox is mainly derived form the low aggregation of active metals with a small crystallite size which was confirmed by XRD and TEM analyses.