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研究论文

La-Ni-Al钙铁矿氧化物中Sr和Ca取代La对甲醇重整的影响

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摘要 Mixed perovskite oxides with $\text{Ca}_x\text{La}_{1-x}\text{Ni}_{0.3}\text{Al}_{0.703-d}$ and $\text{Sr}_x\text{La}_{1-x}\text{Ni}_{0.3}\text{Al}_{0.703-d}$ ($x=0, 0.2, 0.5, 0.8, \text{ and } 1.0; d=0.5x$) components have been prepared by a sol-gel method. The effects of the partial substitution of La by Ca and Sr in dry CH_4 reforming were investigated at 500-800 °C and 101 kPa. The resulting oxides were examined by Fourier-transform infrared spectroscopy, X-ray diffraction, temperature-programmed reduction, scanning electron microscopy, energy dispersive X-ray spectrometry, and BET surface area analysis. Studies following the catalytic tests by carbon analysis show some carbon deposition on this catalytic system. The results indicate that all initial salt entered into a propionate structure, and that most of the solid solution has well defined perovskite structure with surface areas between 3.5 and 9.5 m^2/g . Most of the catalysts performed well in the dry reforming, with CH_4 conversions up to 90%, H_2 yields up to 80%, and H_2 selectivity up to 90%. Among the samples, $\text{Sr}_{0.2}\text{La}_{0.8}\text{Ni}_{0.3}\text{Al}_{0.702.9}$ showed an excellent catalytic performance in CH_4 dry reforming, with a H_2/CO ratio of 1, whereas $\text{Ca}_{0.8}\text{La}_{0.2}\text{Ni}_{0.3}\text{Al}_{0.702.6}$ showed the lowest coke formation (approximately 0.71%).

关键词 [dry reforming](#); [methane](#); [lanthanum](#); [calcium](#); [strontium](#); [perovskite](#)