347c Effect of Dopant Addition on Phase Stability and Oxygen Sorption Properties of La-Sr-Co-Fe-O Perovskite Type Oxides

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Improvement on chemical stability and oxygen sorption properties of lanthanum-cobaltite perovskite type oxides is important for applications of this group of materials for high temperature air separation and partial oxidative catalytic reactions. Perovskite type oxides of La0.1 Sr0.9Co0.9Fe0.1O3-delta doped with 5% amount of Ag+, Ni2+, Ca2+, Ba2+, and Zr4+ were synthesized by the liquid citrate method. The structure stability and oxygen sorption properties of these doped perovskite type oxides were investigated in this study by TGA/DSC and XRD. XRD analysis showed that all the doped oxides maintain the perovskite type structure at room temperature, with expanded lattice compared to the non-doped oxide. Doping Ba2+ or Zr4+ enhances the structure stability but lowers the oxygen sorption capacity and kinetics of the perovskite type oxide. Doping Ag+, Ni2+ can not stabilize the phase structure but can increase the surface reaction constants for oxygen sorption with a slight decrease in the oxygen sorption capacity. A possible mechanism of the doping behavior was proposed to explain the effects of doping on the phase stability and sorption properties. The study provides useful information about choosing perovskite-type oxides as membranes, sorbents and catalysts for high temperature separation and reaction applications.