Lanthanum-Barium Iron-Based Perovskite Oxides for Low Temperature Carbon Dioxide Conversion

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Conversion of CO2 in a scalable technology has the potential for enormous energy and environmental impact but remains a challenge. Here I have presented several stable, earth abundant perovskite oxide materials for the reverse water gas shift chemical looping (RWGS-CL) process as a potential solution for this CO2 mitigation problem. The effect of Ba doping on the conversion of CO2 to CO was investigated on three differently concentrated LaBaFeO3 perovskite oxides. The materials were synthesized and characterized through X-Ray diffraction and temperature programmed reduction and oxidation. The incorporation of the Ba facilitates the formation of oxygen vacancies while maintaining the stability of the perovskite. The La0.4Ba0.6FeO3 proved to have the perfect balance of maintaining stability and yielding a high carbon monoxide level. The Lanthanum provides stability to the perovskite and the Barium allowed a higher yield of CO at a low temperature.