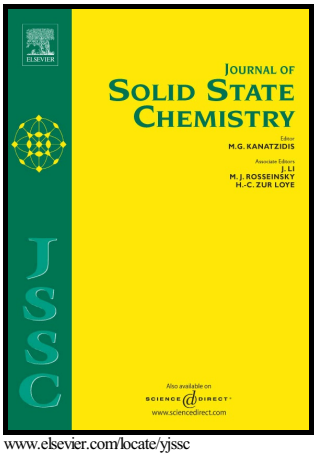

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Improvement of oxygen storage properties of hexagonal $YMnO_{3+\delta}$ by microstructural modifications

Alicja Klimkowicz[1,*], Konrad Świerczek[2,3], Shuntaro Kobayashi[1], Akito Takasaki[1], Wadiah Allahyani[4], Bogdan Dabrowski[4]

[1]Shibaura Institute of Technology, Department of Engineering Science and Mechanics, 3-7-5 Toyosu, Koto-ku, 135-8548 Tokyo, Japan

[2]AGH University of Science and Technology, Faculty of Energy and Fuels, Department of Hydrogen Energy, al. A. Mickiewicza 30, 30-059 Krakow, Poland

[3]AGH Centre of Energy, AGH University of Science and Technology, ul. Czarnowiejska 36, 30-054 Krakow, Poland

[4]Department of Physics, Northern Illinois University, DeKalb, IL 60115, USA

[*]klimkowicz.alicja.ewa.j2@schibaura-it.ac.jp

Abstract

Hexagonal $YMnO_{3+\delta}$ is shown to be an effective temperature-swing oxygen storage material working at low temperatures (150-300 °C) in pure oxygen if adequately processed or obtained having sub-micrometer primary particles with limited number of big agglomerates. A substantial increase of a practical oxygen storage capacity is observed for a sample synthesized by a solid-state method, which was subjected to a high impact mechanical milling. However, even better properties can be achieved for the sol-gel technique-produced $YMnO_{3+\delta}$. The reversible incorporation and release of the oxygen is associated with a structural transformation between stoichiometric $YMnO_3$ (Hex0) phase and a mixture of oxygen-loaded Hex1 with $\delta \approx 0.28$ and Hex2 with $\delta \approx 0.41$ phases, as documented by *in situ* structural X-ray diffraction studies, supported by thermogravimetric experiments. Contrary to $HoMnO_{3+\delta}$, it was not possible to obtain single phase Hex1 material in oxygen, as well as to oxidize $YMnO_3$ in air. Results confirm crucial role of the ionic size of rare