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## Improvement of oxygen storage properties of hexagonal $\text{YMnO}_{3+\delta}$ by microstructural modifications

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### Abstract

Hexagonal  $\text{YMnO}_{3+\delta}$  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  $\text{YMnO}_{3+\delta}$ . The reversible incorporation and release of the oxygen is associated with a structural transformation between stoichiometric  $\text{YMnO}_3$  (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  $\text{HoMnO}_{3+\delta}$ , it was not possible to obtain single phase Hex1 material in oxygen, as well as to oxidize  $\text{YMnO}_3$  in air. Results confirm crucial role of the ionic size of rare

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