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PREPARATION OF HEXAGONAL RARE EARTH MANGANITES BY MOLTEN SALT SYNTHESIS

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Hexagonal rare earth manganites are family of compounds with general formula of $ReMnO_3$ (Re – rare earth element), which demonstrates two ferroic properties in the same phase without any external fields. These compounds are ferroelectrics under high temperature (T_C – 620-1000 K) [1] and display antiferromagnetic ordering at lower temperature (T_N – 57-130 K) [2]. Out of all hexagonal manganites, yttrium manganite ($YMnO_3$) is the most researched one. This material has multiferroic properties with a low Neel temperature (T_N ~ 70 K) and a high Curie temperature (T_C ~ 900 K) [3]. This manganite can be prepared via multiple synthetic approaches, with solid-state synthesis being the most common one. Unfortunately, solid-state synthetic technique has some drawbacks, like long reaction times, several reaction stages, low rates of diffusion, formation of impurity phases and high reaction temperature. These disadvantages can be avoided by conducting the synthesis in inorganic salt medium, with temperature slightly beyond the melting point of the salt, so called molten salt synthesis [3].

In this work we prepared several rare earth manganites by using novel molten salt synthesis technique. All the prepared samples were investigated using several characterization techniques, including X-Ray diffraction, FT-IR spectroscopy and scanning electron microscopy (SEM). It was observed that a use of simple inorganic salt mixture led to the formation of phase pure samples at lower temperature. Moreover, this synthetic approach generated hexagonal shape particles with the size varying in micrometer range (Fig. 1).

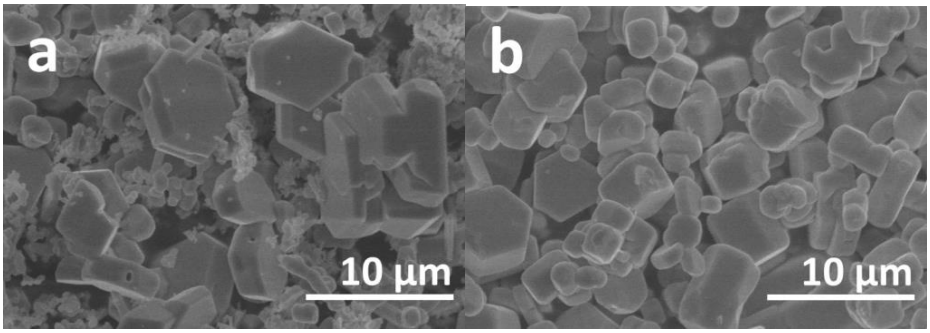

Fig. 1. SEM micrographs of $YMnO_3$, prepared at 1000 (a) and 1100 °C (b) temperatures.

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