

Effect of temperature on the morphology of nanostructures formed in $\text{La}(\text{NO}_3)_3 - \text{Fe}_2(\text{SO}_4)_3$ system



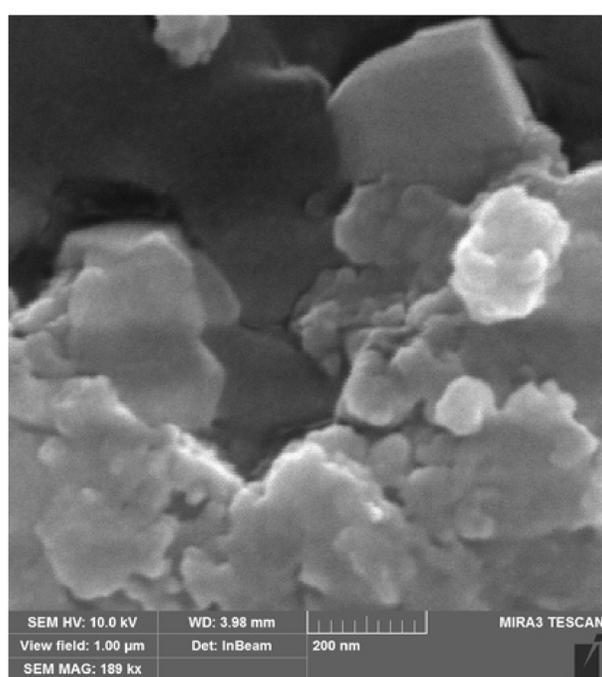
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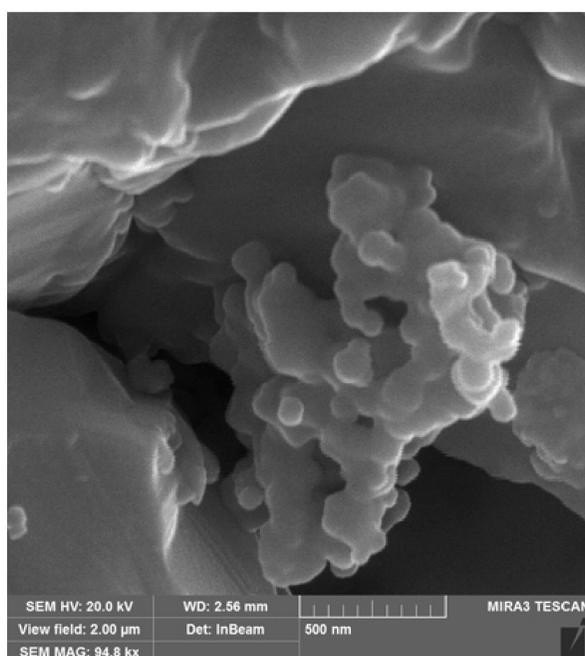
Structure and physical-chemical properties of nanosized perovskite-type oxides based on lanthanides and 3d-transition elements strongly depends on synthesis procedure of the precursor powders [1].

The morphological study of primary phases formed in $\text{La}(\text{NO}_3)_3 - \text{Fe}_2(\text{SO}_4)_3$ system under the influence of temperature treatment is performed in the present work. The phase formation process was carried out by the hydrolysis controlled chemical precipitation. The precipitate composition after dehydration at $T = 160^\circ\text{C}$ includes goethite and lanthanum (III) hydroxide phases.

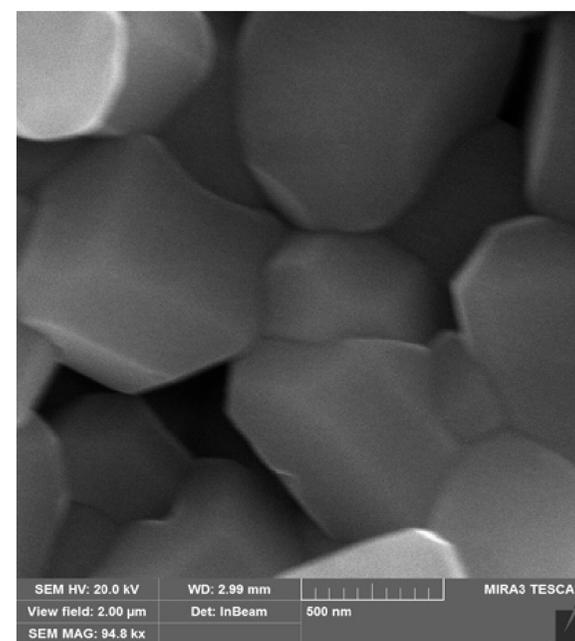
The precipitate's chemical composition according to EDS is: (wt.%) La – 23; Fe – 10.5; O – 34; K – 6.5; S – 10; Na – 16. SEM image (Fig. 1a) shows plate-like $\text{La}(\text{OH})_3$ particles and $\alpha\text{-FeOOH}$ globules. Powder heating to 800°C leads to the formation of both individual lanthanum and ferric oxide's particles (Fig. 1b) with corresponding chemical composition, wt.%: Fe – 80; O – 17.6; La – 1.9; K – 0.5 and La – 40, O – 26.3; S – 14, K – 12; Fe – 7.7. But the following holding of the powders at $T = 1100^\circ\text{C}$ in 5 h results in their homogenization and transformation into perovskite-type structure (Fig. 1c) with average chemical composition, wt.%: La – 53; Fe – 40; O – 7.



a



b



c

Fig. 1. Morphology of the structures formed in the $\text{La}(\text{NO}_3)_3 - \text{Fe}_2(\text{SO}_4)_3$ system, heated within 5 h at $T^\circ\text{C}$: a – 160; b – 800; c – 1100.

1. Gymez-Cuaspud J. A., Vera-Lopez, Barrachina E., Carda-Castelly J. B. One-step hydrothermal synthesis of LaFeO_3 perovskite for methane steam reforming // *Reac Kinet Mech Cat.* DOI 10.1007/s11144-016-1092-8

