https://doi.org/10.33263/Proceedings11.00520053

ISSN: 2668-6384 https://conferenceproceedings.international

Proceedings International

Proceedings, Abstract

Volume 1, Issue 1, Pages 0052-0053
2019

Received: 01.10.2019
Accepted: 10.10.2019
Published: 15.10.2019

Morphological aspects of Bismuth ferrite powders prepared by microwave-assisted hydrothermal method

V.-A. Surdu[1], Y. Wang [2], A.C. Bîrcă [1], E. Tanasă [1], E. Andronescu [1]

[1] Faculty of Applied Chemistry and Materials Science, University Politehnica of Bucharest, Romania
[2] ENSIL-ENSCI Limoges, France

* Correspondence: adrian_v_surdu@yahoo.com; Scopus ID: 56941744700

$BiFeO_3$ particles were synthetized by a fast, reproducible and environmental friendly microwave-assisted hydrothermal method. The aim of the study was the investigation of increased pressure and mineralizer concentration on the reaction mechanism, morphology of particles and aggregates as well as magnetic behavior. Powders were studied when using KOH mineralizer concentration from 4 to 12 M at room temperature and under microwave-hydrothermal conditions at 40 bar and 150 or 200°C.

The reaction mechanism depends on the temperature of the microwave-hydrothermal treatment and the concentration of KOH mineralizer. The precursor powder obtained after coprecipitation step consists of Bi_2O_3, Fe_2O_3 and $Bi_{25}FeO_{40}$ in different ratios. After the treatment at 40 bar and 150°C for 1h the reaction between precursors is not complete, therefore resulting secondary phases of $Bi_{25}FeO_{40}$ and Fe_2O_3. $BiFeO_3$ particles were successfully synthesized at 40 bar under microwave-hydrothermal conditions at a temperature of 200°C and a concentration of KOH of at least 8M. At 6M, the composition consisted of 98.5% $BiFeO_3$ and 1.5% Bi_2O_3 as evidenced by Rietveld refinement.

The competition between dissolution and precipitation of Bi^{3+} and Fe^{3+} in KOH solutions of different concentrations was investigated by Raman spectroscopy and EDS analysis. Thus, at 200°C there was evidenced a Bi_2O_3 secondary phase for 6 M KOH concentration and poor control of Bi/Fe ratio in $BiFeO_3$ at KOH concentrations of 10 and 12 M.

Particle and aggregates morphology depicted by FE-SEM investigations showed a tendency to form irregular shaped particles at KOH concentration of 6 M, for which the reaction is not complete. When increasing the concentration, $BiFeO_3$ particles exhibit regular shapes from cubic at 8 M to cvasi-spherical at 14 M.

M-H curves characteristics illustrate that Bi/Fe ratio and preferential orientation of crystal growth influence the magnetic behavior of $BiFeO_3$ crystalline powders.

Keywords: *Bismuth ferrite powder, microwave, hydrothermal method.*

Cite This Work: Surdu, V.A.; Wang, Y.; Bîrcă, A.C.; Tanasă, E.; Andronescu, E. Bismuth ferrite powders prepared by microwave-assisted hydrothermal method. Proceedings Int **2019**, 1, 0052-0053. https://doi.org/10.33263/Proceedings11.00520053

Funding

Not applicable.

Acknowledgments

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

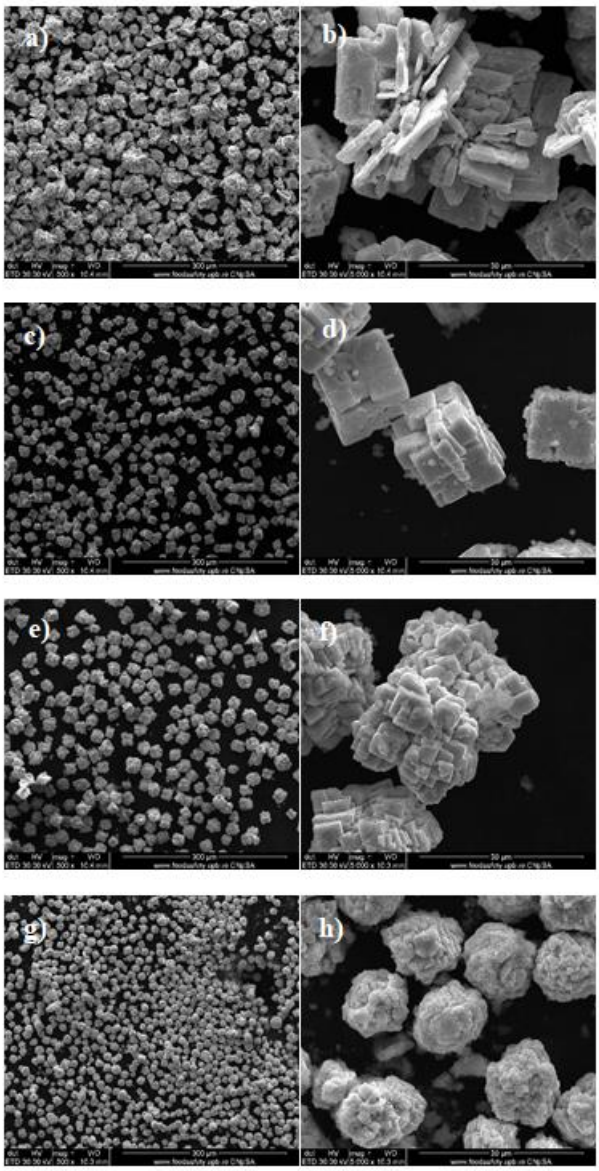

Figure 1. a), c), f), h) FE-SEM general view, b), d), g), i) FE-SEM detail at 8, 10, 12 and 14 M KOH concentration of $BiFeO_3$ powders.