DEVELOPMENT OF NEW VARIANTS OF SYNTHESIS FOR SPINEL NANOSTRUCTURES WITH POTENTIAL APPLICATIONS IN ENVIRONMENTAL PROTECTION

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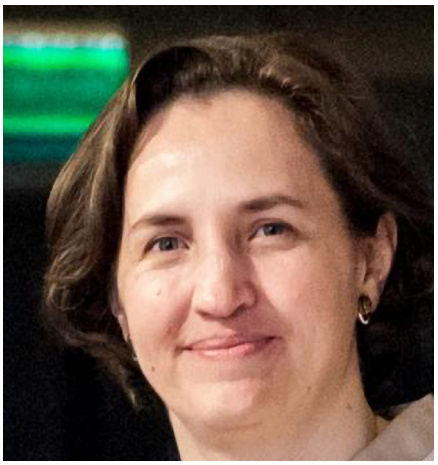

Abstract

This thesis synthetically presents the results obtained in the field of synthesis, characterization and environmental applications of nanostructured oxides systems.

The first part of this Habilitation Thesis presents the main professional, scientific and academic achievements obtained after granting the PhD title, aswell as a selection and scientific results representative for my activity in the field of development of new variants of synthesis for spinel ferrite nanoparticles with potential environmental applications.

It is well known that the reduction in size of ferrite particles to nanometric scale leads to special properties for these materials, different from those of the bulk (micrometric) material. It has also been demonstrated that the chemical and magnetic properties of nanoparticles in general (and in particular spinel ferrites) are strongly influenced by their composition, structure and morphology, which, in turn, are dependent on the synthesis methodology. Hence the importanceof developing new synthesis variants by modifying the already known synthesis methods so as to provide the most advanced control over the shape and size of nanoparticles and, implicitly, over their properties. In this context, my research activities on the development of new synthesis variants,focused on four of the synthesis methods employed to obtain nanocrystalline spinel ferrite: the thermal decomposition of the precursors, the solvothermal method, the coprecipitatio method and the sol-gel method.

Thus, in the case of the method based on the thermal decomposition of the precursors obtained in the redox reaction between the mixture of nitrates and diols, I have expanded the research by using polyols as reducing agents, such as high molecular weight polyvinyl alcohol.

An important chapter included in the scientific part of this thesis is the testing of MFe2O4/active carbon composites (M = Fe(II), Mn(II)) for the removaloforganic pollutants (phenol, organic dyes) from water. These composites combine the high specific surface area of the activated carbon (which givesthe composites high adsorption capacity) with the magnetic properties of ferrite nanopowders, which ensure a simple separation of the composite from the suspension.The second part of this thesis presents the evolution and development plan of the professional, scientific and academic career, the proposed objectives and the future research directions

The full thesis at:
http://www.upt.ro/img/files/2016-2017/abilitare/stoia/Stoia_Marcela_Teza_abilitare.pdf

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