ABSTRACT

The doctoral thesis is focused on magnetoelectric multiferoic materials, a class of materials in which magnetic and dielectric ordering occur. Due to chemical and symmetry considerations, such materials are rare and difficult to control. To date, almost half of the total number of publications on multiferoic materials refer to bismuth ferrite (BiFeO3). However, many questions about the possibility of using this material in industrial applications have not been answered yet.

The present study followed the aspects regarding the processing of powders and ceramics based on $BiFeO_3$ on the functional properties of the obtained materials by stabilization of the perovskite phase through doping and unconventional synthesis and consolidation methods. Chapter 2 highlighted the current state of knowledge in the systems based on $BiFeO_3$, representing the premises from which the present work started.

Chapter 3 presents original results regarding the obtaining of $BiFeO_3$ by unconventional methods of powder synthesis, such as sol-gel route, microwave-hydrothermal synthesis and thermal decomposition of bismuth ferroxalate and consolidation of ceramic bodies by Spark Plasma Sintering. Chapters 4, 5 and 6 show the effects of introducing the substituents in the phase of interest by studying the compositional systems of the $BiFeO_3$-$MeFeO_3$ type, where Me = Eu, Y and Nd.