



HAL
open science

Chapter 23. Single and Heterostructure Multiferroic Thin Films

Antoine Barbier

► **To cite this version:**

Antoine Barbier. Chapter 23. Single and Heterostructure Multiferroic Thin Films. Magnetic, Ferroelectric, and Multiferroic Metal Oxides, Elsevier, 2018. cea-01693097

HAL Id: cea-01693097

<https://cea.hal.science/cea-01693097>

Submitted on 25 Jan 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Chapter 23. Single and Heterostructure Multiferroic Thin Films

Authors: Antoine Barbier

Affiliation: Service de Physique de l'Etat Condensé, SPEC, CEA, CNRS, UMR 3680, Université Paris-Saclay, CEA Saclay, 91191 Gif-sur-Yvette Cedex, France

Keywords: Multiferroic thin films, oxide layers, magneto-electric coupling, epitaxial layers, perovskite, ferrites, manganites

Abstract:

Multiferroic oxide materials exhibiting several long range ferroic orders are of high interest because of their wide range of potential applications. The incorporation of their genuine properties in new devices, offering additional physical properties, requires often elaborating them in form of thin films. Retaining their multiferroic characteristics is very challenging. However, thin films can be structured on the nanometer scale and additional degrees of freedom, such as the composition (single- and multi- phase), orientation, and substrate stress become available in addition to eventual magnetic interlayer couplings leading to an avenue of new possibilities. The chapter describes the physical concepts specific to thin films and report on single and multi-phase multiferroic layers realized by a large variety of elaboration techniques including molecular beam epitaxy, pulsed laser deposition, magnetron sputtering and sol-gel methods etc. The chapter will review mainly the properties of single phase bismuth ferrite, combined ferrite-perovskite thin films and manganites.