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Chapter 23. Single and Heterostructure Multiferroic Thin Films

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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.