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Multiferroic perovskites under epitaxial strain

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Propositions

accompanying the thesis:

“Multiferroic perovskites under epitaxial strain:

The case of TbMnO₃ thin films”

by Christophe J.M. Daumont

1. For a 2-fold symmetric material grown on a 4-fold symmetric substrate, twin domains will form above a certain film thickness (chapter 3).
2. In very thin films of TbMnO₃, the domain formation leads to a very high density of crystallographic domain walls and, thus, very small domains (chapter 3).
3. In TbMnO₃ films, the magnitude of the induced magnetic moment follows the same trend, as a function of thickness, as the density of crystallographic domain walls and the orthorhombicity of the films (chapter 4).
4. Impedance spectroscopy and Cole-Cole plots are very useful in separating intrinsic and extrinsic effects on the dielectric constant (chapter 5).
5. DyScO₃ substrates seem like ideal candidates for the growth of single domain TbMnO₃ films. However, extra difficulties arise with the use of DyScO₃ as a substrate (chapter 6).
6. Crystallographic domain walls influence the magnetic/dielectric properties of ferroic thin films (this thesis).
7. The difficulty to provide a full structural characterization of very thin films impedes the understanding of their ferroic properties.
8. The structural distortions, present in the material to be deposited and the substrate, are as important as the lattice mismatch to determine the thin film growth.
9. The French point of view on food is related to satisfaction of senses whereas the Dutch point of view is based on satisfaction of energetic criteria.
10. “You have your way, I have my way. As for the right way, the correct way, and the only way, it does not exist” Friedrich Nietzsche, 1844-1900. However, some ways are better than some others depending on the goal to reach. Thus, what exists is a best way for a given goal.
11. “New opinions are always suspected, and usually opposed, without any other reason but because they are not already common” John Locke, 1632-1704. History and, in particular, science indeed show us to be open-minded about opinions differing from the common beliefs, as they might carry a part of truth. They should raise interest and curiosity instead of rejection.