

**Influence of substrates structure on magnetic and dielectric properties of CoFe₂O₄
and BaTiO₃ magneto-electric multilayer thin films**

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The understanding of magnetoelectric (ME) materials, in which the magnetisation can be controlled in applying an electric field, or the electric order via magnetic field, are of great interest because of their potential novel applications in memory storage, field sensors and more generally for multifunctional devices. Combination of highly piezoelectric and magnetostrictive materials in the magneto-electric composite films [1] is expecting to give a high ME response via an elastic coupling at the interface. BaTiO₃ and CoFe₂O₄ are amongst the best oxide materials candidates for such elastic interaction.

Innovative multilayers superstructures of BaTiO₃ and CoFe₂O₄ were prepared by Pulsed Laser Deposition on different single crystal substrates such as MgO, LaAlO₃ and SrTiO₃. The in- and out-of-plane strain, induced in the structures, was studied by symmetric and asymmetric X-ray diffraction measurements. Furthermore, the interfaces between the layers were analysed by Transmission Electron Microscopy, which emphasizes the film growth mechanism and its relation to structural defects such as dislocations.

Despite various lattice mismatches (from -10% to +0.4%), the films were grown epitaxially and their in-plane crystallographic structure matches the substrates. The surface quality of the films was observed by AFM, SEM, and despite the good quality of the films, micro and nano defects and interfacial compatibility between the layers has a significant impact on the individual layers functionality. Magnetic and dielectric measurements will also be presented and discussed.

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References

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