

Magnetoelectric coupling in artificial multiferroic heterostructures

Carlos A. F. Vaz

Swiss Light Source, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland

Abstract

The recent advances in the controlled growth of oxide thin films and heterostructures, and the development of new tools targeting the atomic and nanoscale characterisation of interfaces has led to an upsurge in the discovery of a wide range of interfacial phenomena [1]. The latter are a direct consequence of the break of inversion symmetry and of electron exchange effects that occur across the interface. Here we are interested in those interfaces where an additional break in time-reversal symmetry occurs, making possible the presence of magnetoelectric effects, i.e., of inducing a cross coupling between magnetic and ferroelectric degrees of freedom in materials known as multiferroics. In this context, I will discuss the different mechanisms that can give rise to a magnetoelectric coupling between ferromagnetic and ferroelectric layered heterostructures, with emphasis on strain- and charge-mediated coupling [2,3]. I will also discuss the challenges that need to be overcome for the investigation of the dynamics of magnetoelectric coupling in such types of multiferroic heterostructures [4].

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