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Surface science of perovskites and 2D oxide quasicrystals

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Oxide heterostructures are novel materials with a variety of applications. Often bulk properties define their characteristics, but new interesting concepts and properties arise from their interfaces. This is discussed here for surfaces and thin films of barium titanate (BTO), the most studied ferroelectric material, for which we find surface-specific structural, vibrational, and ferroelectric properties [1]. Especially the discovery of a two-dimensional oxide quasicrystal that is long-range ordered, but aperiodic, adds an interesting new concept [2]. It reveals a sharp 12-fold diffraction pattern, a symmetry that is forbidden for periodic structures. Scanning tunneling microscopy resolves the aperiodic structure of surface atoms. The structure of this 2D quasicrystal and its periodic approximant will be discussed.

[1] A. Hofer et al., Phys. Rev. Lett. 108, 087602(2012).

[2] S. Forster et al., Nature 502, 215 (2013).