

TNT04 ABSTRACT SUBMISSION:
Challenges on the way to the ferroelectric limit

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Piezoresponse force microscopy (PFM) is a powerful analysis tool for Nanotechnology. With this method it is possible to measure local piezoelectric areas and to study the domain structure in the nanometer scale. A lot of research is focused on finding the ferroelectric limit i.e. the dimension below which the ferroelectricity is quenched. Several problems arise when the dimensions are continually decreased e.g. the stoichiometry of the crystals is extremely difficult to control, size effects can occur and the influence of chemisorbates and physisorbates cannot be neglected. It is of major importance to take these influences into account.

When studying the ferroelectric limit certain small areas of a sample often show no piezoresponse. In these cases the conclusion that the limit has been overstepped can be drawn very quickly. As the atomic force microscope analyzes the state of the surface there could be other factors influencing the PFM-response misleading to the assumption, that the limit has already been reached. Is the surface of the piezoelectric sample clean or might it be that it is contaminated in some areas resulting in a capacitive voltage divider leading to a reduced voltage being applied to the actual piezoelectric sample? Is there an influence of the temperature on the measurements?

These questions will be investigated and measurements on ABO_3 -type Perovskites giving insights into these phenomena will be presented.