

## Conductive AFM study of ferroelectric domain walls

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INVESTIGATE THE PHYSICAL ORIGIN OF DOMAIN WALL CONDUCTION AT THE NANOSCALE

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In the last decade the ferroelectric community has witnessed a surge of interest for domain wall (DW) conductivity. This phenomenon supports the possibility of inscribing in the bulk of an otherwise insulating material highly stable, nearly two-dimensional "sheets" with high conductivity. All that need to be done is to apply a suitable local electric field pulse in the region of interest to create the conductive link, and another pulse with the opposite sign to erase it.
This appears as a very exciting possibility for the development of a radically new paradigm at the forefront of nanoelectronics, photonics and hybrid optoelectronics. First examples of domain walls memories have appeared, where the information is stored as high-low conduction states in nanometer-sized regions without energy consumption. Other visionary applications where reconfigurable electrical circuitry is written and erased on demand inside the material have been suggested. However the fundamental reasons besides the high DW conductivity are still poorly explored.
The goal of the LOcalized charge Carriers in DOmain Wall conNduction (LOCDOWN) project is to investigate the role of polaron transport in domain wall conductivity of lithium niobate thin films. This will be accomplished by developing a dedicated conductive probe microscopy setup and combining it with other tools such as electrical I-V characterization as a function of temperature, high resolution X-Ray diffraction and theoretical models for the description of polaronic transport in lithium niobate.

