SLIFE
“Swiss-Lithuanian Ferroelectrics: From controlled internal fields to energy harvesting / medical diagnostics / microelectronic applications / SLIFE”

Duration of the project: 2012.12.01-2016.03.01

The objective of the project
Ferroelectricity is the property of some polar materials to undergo polarization reorientation when subjected to external electric field. Ferroelectrics are ubiquitous materials in modern technology with substantial interest in further extending their functionality in components of medical-diagnostic equipment (using the piezoelectric effect), microelectronics and communications (ferroelectric switching and dielectric properties), and energy harvesting (piezoelectric, pyroelectric, photovoltaic effects).

Real ferroelectric materials have internal electric fields due to finite size, charged defects, and inhomogeneities in the material. This is even more pronounced in thin films. These inevitable fields are often considered a hurdle, typically causing degradation of properties. Several recent studies showed strongly enhanced properties (piezoelectric, dielectric, photovoltaic) originating from internal fields, hinting that internal fields could be beneficial if properly addressed. This triggers us to propose the present project, in which, leveraging on our complementary competences, we aim to better understand internal fields in ferroelectrics and use them to obtain enhanced functionality.

Ultrasound Institute
Will perform ultrasonic characterisation of the developed BTO and PMN-PT crystals. In addition, numerical simulations will be carried out and novel transducer models using the enhanced crystals will be developed.

Project partners
Ecole Polytechnique Federale de Lausanne EPFL (Switzerland), Vilnius University (Lithuania), Kaunas University of Technology (Lithuania).