



ICAMS Special Seminar

Thursday, 17th October, 10:00 a.m.
Room IC 02-714

Dr. Ivan Vorotiahin

Institute for Materials
Materials Modelling Division
TU Darmstadt, Germany

Describing the charged defect redistribution in a ferroelectric domain structure with the Landau-Ginzburg-Devonshire theory

The process of aging can be a crucial factor in functioning of ferroelectric-based devices. Manifesting itself in a long-time run, it changes the characteristics of a ferroelectric material and may be caused by migration of charged defects and impurities, intentionally or unintentionally introduced into the bulk. While it is established that the aging influences the shape of hysteresis loops, the experimental observations also suggest that the influence extends to the change of the domain array. As more understanding of the governing processes is needed, they can be explained by analysing the model domain array and its evolution in time influenced by mobile charged defects.

For this purpose, the Landau-Ginzburg-Devonshire theory is extended to account for the charged species movement, allowing them to redistribute over time, compensating the depolarization fields, which represents one of the aging mechanisms. The analysis of changes in the domain structure and its characteristics caused by the defect redistribution allows to separate different subprocesses and establish their hierarchy, giving a insight into the microscopic reasons and mechanisms leading to modifications of the domain array.