

Operando observation of structural relaxation in ferroelectric GeTe(111)

Tuesday 29 October 2019 14:00 (30 minutes)

(Mn,Ge)Te is a remarkable multiferroic material that combines ferroelasticity, ferroelectricity, ferromagnetism and a topological band structure [1,2]. The interplay of these effects via ferroelectric polarization and Rashba spin splitting makes it attractive for device applications in electronics, spintronics and quantum computing. Using photoelectron diffraction (XPD) in an operando setup with applied bias voltage we study the detailed atomic structure of the topmost surface layers of the host material α -GeTe and their response to the static electric field. We find that the surface of thin films is particularly susceptible to the electric field and that it is isolated from the bulk by a stable domain wall. A challenge for applications is that the polarization amplitude fades after few switching cycles. The origin of this fatigue is under investigation. Knowing the exact position of the atoms in the active layer is crucial information towards the understanding of the switching and mechanism and the microscopic cause of fatigue.

1. Przybilinska, et al.; Phys. Rev. Lett. 112, 047202 (2014)
2. Krempasky, J, et al.; Phys. Rev. X 8, 021067 (2018)

Position

Scientist

Primary authors: MUNTWILER, Matthias Kurt (Paul Scherrer Institut); KREMPASKY, Juraj (SLS); Prof. SPRINGHOLZ, Gunther (Johannes Kepler Universität, Linz); DIL, Jan Hugo (Paul Scherrer Institut)

Presenter: MUNTWILER, Matthias Kurt (Paul Scherrer Institut)

Session Classification: Poster session

Track Classification: Poster