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Near-field second-harmonic imaging of ferroelectric domain structure of $YMnO_3$ C.C. NEACSU, Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany, B.B. VAN AKEN, M. FIEBIG, Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; University of Bonn, Bonn, Germany, M.B. RASCHKE, University of Washington, Seattle, Washington, USA — Ferroelectrics have attracted much recent interest for applications in, e.g., data storage devices. The ferroelectric domain formation and order in a single crystal is the result of a subtle interplay between electric field and the elastic and domain wall energies to minimize the total free energy of the system. This makes the prediction of domain size and shape a priori difficult. Due to its symmetry selectivity optical second-harmonic generation (SHG) is sensitive with respect to the ferroelectric order in a system. For spatially resolved imaging we combine it with tip-enhanced near-field optical microscopy providing resolution down to 10 nm. Unpoled single-crystalline multiferroic $YMnO_3$ with the order parameter along the hexagonal z-axis and in the surface plane was probed. With the incident laser field polarized parallel to the tip axis we selectively access the nonlinear tensor component χ_{zxx} of the sample. The imaging contrast arises from the local interference between the induced SH-polarization in the sample and the SH reference field of the tip apex itself. The domains are found to be anisotropically elongated along the hexagonal axis with dimensions of several 100 nm.

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