UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Theorie-Kolloquium WS 2023/24
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Ferroelectric domain walls revisited

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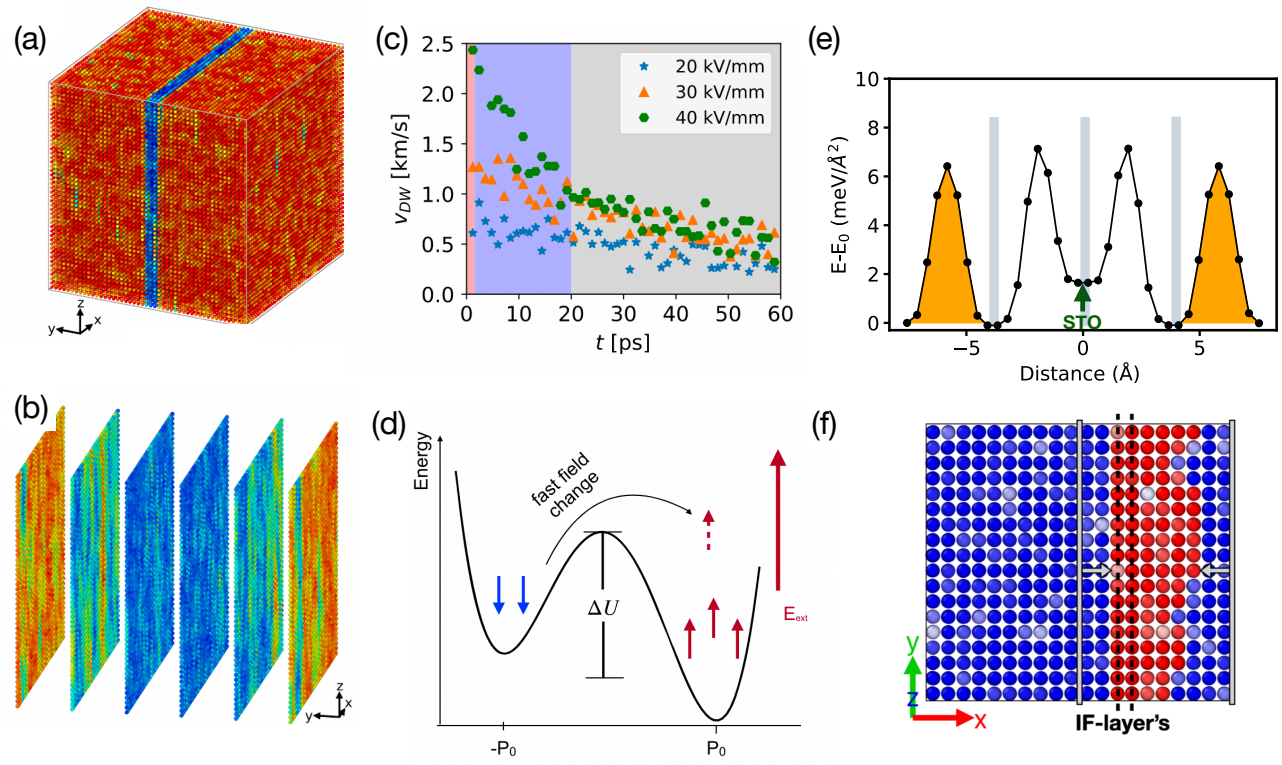

Domain walls and phase boundaries are fundamental ingredients of ferroelectrics and govern their functional properties important for applications ranging from frequency conversion, energy harvesting, electrocaloric cooling and piezoelectric actuation to data storage. Although both interfaces have been studied for decades, often only a phenomenological macroscopic understanding has been established and recent studies reveal unexpected microscopic properties [1].

We revisit the field-induced domain wall motion in (Sr,Ba)TiO_3 with atomistic simulations and show how fast field changes may boost the wall velocity [2] and how inhomogeneities may act as pinning centers [3]. In the orthorhombic phase, local non-180 switching of dipoles on the traveling walls results in transient local Bloch type walls and dipole vortices. [4]

[1] A. Grünebohm et al. J. Phys. Cond. Matter 34, 073002 (2022).
[2] R. Khachaturyan et al., Phys. Stat. Solidi RRL 16, 2200038 (2022).
[3] A. Dimou et al., Phys. Rev. B 106, 094104 (2022).
[4] R. Khachaturyan et al. arXiv:2310.12028 (2023)