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Non-local switching of polar domain network in twisted boron nitride layers

Kyoung Pyo Lee

Department of Physics, The University of Texas at Austin, Austin, TX, USA

Ferroelectric polarization domains and their switching dynamics have been extensively studied in conventional ferroelectric systems. Recently, a new form of ferroelectricity, termed "Moire ferroelectricity," has emerged in two-dimensional materials, where polarization domains arise due to broken inversion symmetry at twisted interfaces. This novel system is expected to exhibit distinct switching characteristics compared to conventional ferroelectrics, owing to the presence of a domain network. In our study, we explored the potential link between the domain network structure and polarization switching behavior in twisted hexagonal boron nitride. By applying a local electrical field using a biased tip, we observed non-local switching of the domain network via scanning Kelvin probe microscopy. Furthermore, the dynamic evolution of the polarization domains was captured through raster scanning, showing temporal deformation of the domain walls.