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Properties and Dynamics of ferroelastic Domain Walls in Perovskites

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Abstract:

Domain wall (DW) properties and their dynamics are of crucial importance for describing the macroscopic behavior of materials. Upon application of an external stress field, domain walls can be set in motion. However, their movement is restricted due to a pinning of DW's to defects which slows down any dynamic process. Pinning and depinning of domain walls to defects plays an important role for their propagation and dynamical behavior. This thesis investigates the DW dynamics in ferroelastics with Dynamical Mechanical Analysis (DMA) measurements as a function of temperature, frequency and dynamic force amplitude. The frequency dependence of DW motion reveals interesting characteristics and a dynamic transition occurs at a characteristic frequency marking a crossover from stochastic DW motion to a pinned regime. In the stochastic regime, signatures of „crackling noise“ are found due to irregular and jerky DW movements.