Ladder Ferroelectricity by vdW Sliding

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We demonstrate and study a polar layered system with distinct ladder-like electric polarization steps that accumulate with each extra atomic layer. Moreover, the symmetries of these diatomic crystals translate planar shifts by one interatomic spacing to the out-of-plane switching of the structure and its polarization. I will discuss the origin of this ultimately thin interfacial polarization, the unique cumulative response at the atomic limit, the robust co-existence with in-plane conductivity, and the switching dynamics observed in our KPFM experiments and modelled by our first principle calculations.

References

[1] "Interfacial ferroelectricity by van-der-Waals sliding" https://www.science.org/doi/10.1126/science.abe8177
[2] "Cumulative Polarization in Conductive Interfacial Ferroelectrics" https://www.nature.com/articles/s41586-022-05341-5

Figures

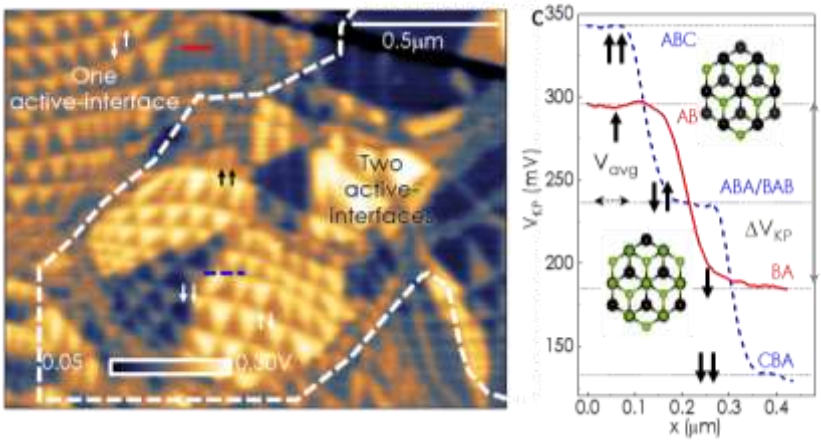

Figure 1: Electric surface potential of interfacial polarization in parallel TMD trilayers

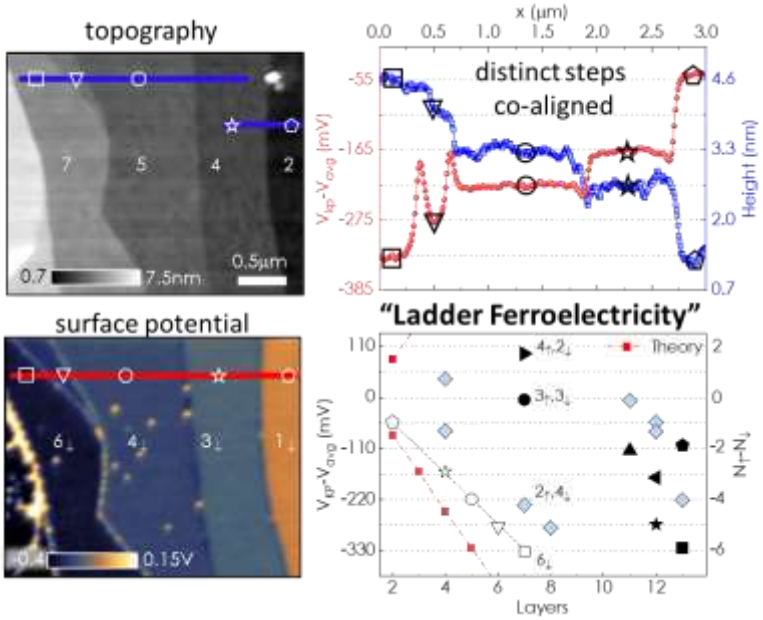

Figure 2: Distinct surface potential steps in multilayer polytypes