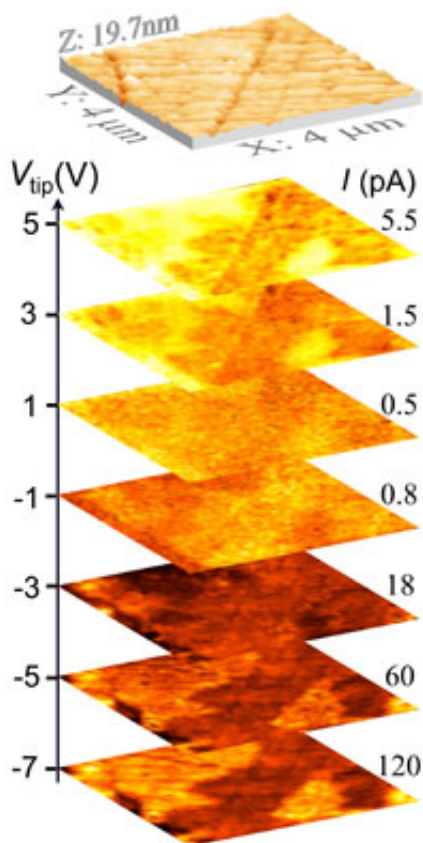


Highlight: Polarization-modulated rectification at ferroelectric surfaces

4 June 2010



Topographic and cAFM images of HoMnO₃ surface taken in spectro-microscopic mode (tip bias on left axis, current scale on right axis). Image size is 4x4 μm². Bright contrast indicates larger absolute current value for $V > 0$.

A combined electrostatic force and conductive atomic force microscopy study on single-crystalline ferroelectric HoMnO₃ recently was published by users from Rutgers University and Chung-Ang University in South Korea, working collaboratively with the Electronic & Magnetic Materials & Devices Group at the Argonne National Laboratory.

By comparing data obtained at the same sample location but at different temperatures — below and above charge carrier freezing — the local Schottky-

like rectification effect at the tip-surface junction was shown to be modulated by ferroelectric polarization.

Additionally, the crossover to a space-charge limited conduction mechanism at higher voltages in the conductance spectra for both up and down domains was demonstrated.

These new results reveal an intriguing interplay between electronic properties and ferroelectric polarization, and point to the possibility of multiferroic electronics with ferroelectric, magnetic, and charge transport multifunctionality in small band-gap multiferroics.

More information: Weida Wu, J. R. Guest, Y. Horibe, S. Park, T. Choi, S.-W. Cheong, and M. Bode, *Phys. Rev. Lett.* 104, 217601 (2010).

Provided by Argonne National Laboratory

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