Abstract Submitted
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Theoretical model of the tunneling current between a metallic tip and a ferroelectric material.[1] RAVI NEUPANE, ANDREW YOST, TEYU CHIEN, Univ of Wyoming — We present a model to calculate the tunneling current for a ferroelectric (FE) material in a metal/vacuum/Ferroelectric tunneling junction. Using this model, we try to explore the effect of the FE dipole orientation's direction on $I-V$spectrum using scanning tunneling spectroscopy (STS). The STM tunneling current for non-FE materials depends upon various factors such as tip -sample distance (vacuum gap), temperature, density of states (DOS) of tip and of sample, and tip-sample bias. FE materials have internal electric dipoles giving rise to internal and external electric fields. The electric field induced by these dipoles will distort the fermi level as a function of depth in the material. In our model, the Fermi level is assumed to be inclined with a slope as a function of the depth. The slope depends upon the orientation and the strength of the electric dipole moment. In this model we use the WKB method accounting for the slope of the fermi level to calculate the tunneling probability from tip to different depths then summing all contributions to obtain the total current as a function of tip-sample bias, i.e. $I-V$curves.

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