SEMINARIO

FERROELECTRIC TUNNEL JUNCTIONS: MECHANISMS FOR THE TUNNELING ELECTRORESISTANCE EFFECT

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MIÉRCOLES 22 DE JUNIO A LAS 12:00

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Ferroelectric materials are characterized by a spontaneous electric polarization switchable by an applied electric field, which makes them attractive for application in non-volatile memory devices. Recent developments in thin-film ferroelectricity have demonstrated the possibility of achieving a stable and switchable ferroelectric polarization in nanometer-thick films. This discovery opened up the possibility of using thin-film ferroelectrics as barriers in tunnel junctions. The signature property of a FTJ is the tunneling electroresistance (TER) effect – a sizable change in resistance of the junction upon the reversal of the electric polarization of the ferroelectric barrier. Large values of TER are favorable for device application of FTJs, and thus understanding the physical mechanisms responsible for TER is critical. This talk will review our current understanding of the mechanisms controlling the TER effect in FTJs. Starting from simple models for TER, we will address more intricate physical mechanisms responsible for this behavior, providing links between theoretical modeling and experimental results where appropriate.