# Seminários do Centro de Física
## Centro de Física da Universidade do Minho
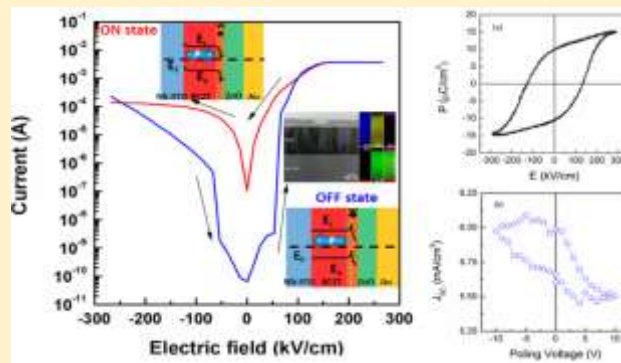
**Research line:** _Functional and smart materials and surfaces for advanced applications_

# Ferroelectric based devices for memory and energy applications

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**ABSTRACT:** Recently, ferroelectric-semicondutor heterostructures have been considered as one of the most potential candidates for next-generation non-volatile memories and photovoltaic (PV) devices. The scientif interest in these heterostructures arises from the charge coupling effect between the ferroelectric and the semiconductor layers, which can enhance the resistive switching (RS) and the PV effects.

In this talk, I will present and discuss the most important achievements obtained in $0.5Ba(Zr_{0.2}Ti_{0.8})O_3$-$0.5(Ba_{0.7}Ca_{0.3})TiO_3$ (0.5BZT-0.5BCT)/ZnO heterostructures for resistive random access memories (RRAMs) and PV devices. An unusual RS behavior is observed in the 0.5BZT-0.5BCT films, where the RS ratio can be 500 times enhanced in the 0.5BZT-0.5BCT/ZnO heterostructures. The RS enhancement is explained by the barrier potential profile modulation of the depletion layer, at the 0.5BZT-0.5BCT/ZnO junction, by the polarization switching of the ferroelectric 0.5BZT-0.5BCT layer.

Moreover, we studied the effect of the position of the ZnO layer on the PV response of the 0.5BZT-0.5BCT/ZnO heterostructure. The enhanced ferroelectric PV effect was achieved for the Pt/ZnO/0.5BZT-0.5BCT/ITO heterostructure with the $J_{sc}$ $\approx 6.1 mA.cm^{-2}$. The photovoltaic effect is explained in terms of the alignment of the internal electric fields and by the polarization-dependent interfacial coupling effect at the ZnO/0.5BZT-0.5BCT interface, which was confirmed by the presence of a hysteresis loop on the $J_{sc}$ as a function of the poling voltage.

**At 15h30min: Meeting : Upgrading of PVD coating systems**