

## PhD Subject Offer

### **Nanomanipulator, XRD and AFM studies of organic materials suitable for organic and inorganic solar cells.**

**Goal:**

The PhD candidate will achieved advanced analytical skills with some knowledge on processing. Specific technique using AFM dual tip measuring have to be put in place. Complementary FTIR, SEM-FIB, XRD will be used intensively. Finally understanding the electrical transport and conductive mechanism will drive the choice of device application and modelling.

**Area:** Nanotechnology , Material characterization and modelling

**Application:** Hybrid solar cells, energy harvesting and chemistry

We propose to investigate self-assembled nanostructures and their nanocomposites prepared from synthetic porphyrins that can potentially advance solar energy conversion that can be used onto organic and inorganic materials. Photoconductivity of those materials is ongoing study as well the dependence of the material structure and preparation on the optical and electrical properties. The novel materials will be mainly prepared in Sandia National Labs while our facilities in Portugal will provide strong characterization tools and device fasability. In particular understanding the charge distribution onto the porphyrins it is essential to understand how and 'where' the material can be conductive or insulating. This can only be achieved using advanced conductive AFM and nanoprobe-SEM combined with a FIB system. Finally specific force mapping AFM should be develop to characterized the crystallinity and amorphocity of the materials (indentation and elasticity mapping).

The materials studied are usually very low cost. Their deposition can be done via inject or just via 'painting'. We want then to understand how to use those materials eventually on dye solar cells and provide the fasability of cost/efficiency solar conversion devices.

**Host institution:** CENIMAT (Centro de Investigação em Materiais) – FCT/UNL

Possibility to spend a small period of time in USA to learn how to prepare the porphryn can eventually be taken into account.