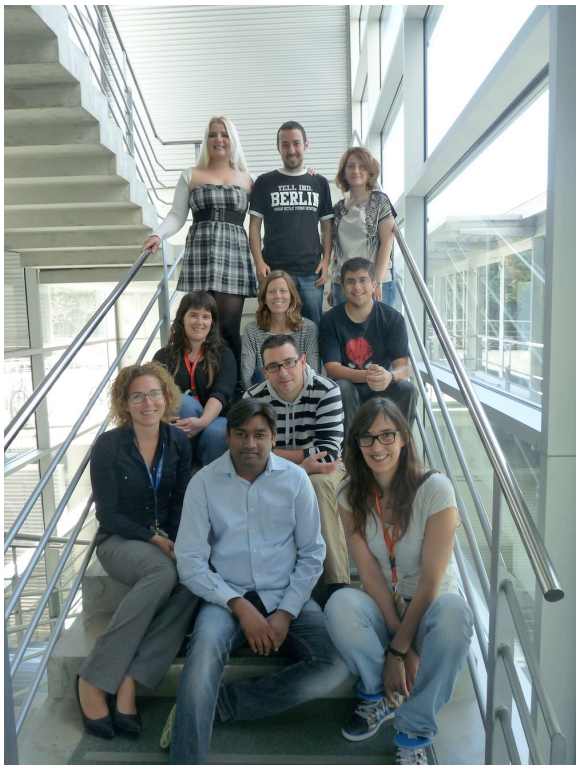
# Palomares Research Group



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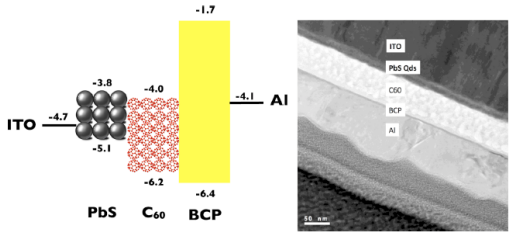
## Abstract

The research on carbon neutral renewable energy sources based upon the combination of supramolecular chemistry, nanostructured inorganic materials science and optoelectronic device physics is emerging as a powerful technology platform for the 21st Century. Since the group formation in 2006, our particular interest has been the development of light driven molecular devices (solar cells) where the limited functionalities of individual molecules are enhanced by their organisation into larger systems, which can be used to convert light into different types of energy sources.
On the other hand, we also are devoted to the development and study of novel materials for biomedical applications

During the last year our group has focussed on the study of the charge transfer reactions in molecular photovoltaic cells and novel nanoscale materials for bio-applications.
In molecular photovoltaic devices we have continued our work on the dye molecular structure *vs* device efficiency. The group has focussed on the use of quantum dots (**Scheme 1**) for efficient light-to-energy conversion devices.




**Scheme 1** Energy level alignment in PbS/C60/BCP based hybrid solar cells. Ref. J.Phys. Chem. C, 2103,117, 17470.

Moreover, We also investigated the charge recombination losses in organic solar cells under working conditions (**Figure 1**) and demonstrated the relationship between the polymer crystallinity and the charge losses due to non-geminate recombination.

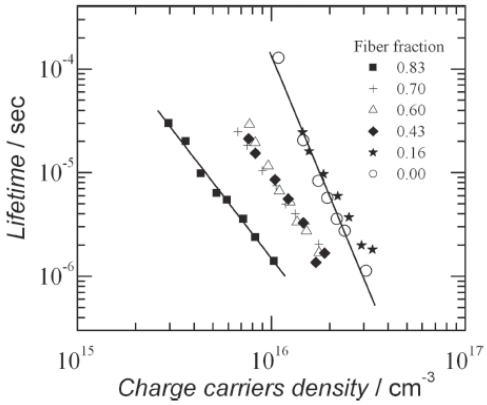



**Figure 1**. Charge recombination lifetime for BHJ devices ). *FromAdv. Energ. Mat., 2013, 4, 466.*

Our new research line for the preparation and the characterization of nanomaterials, which can be applied in nanomedice for theragnosis has focussed on the synthesis of biocompatible nanomaterials (**Figure 2**) with applications as bio-markers .

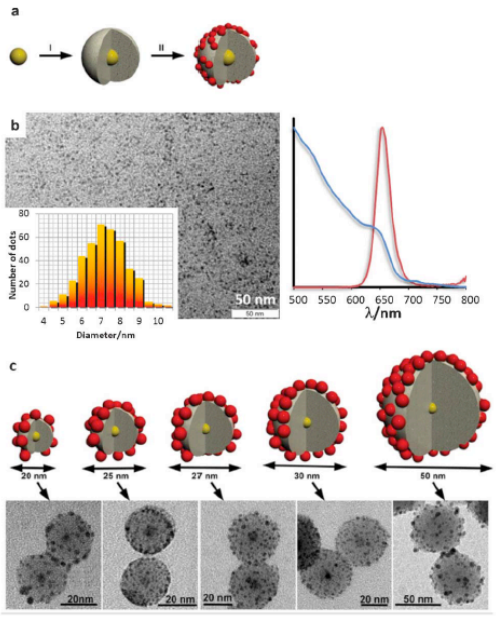



**Figure 2**. Photonic nano-objects for selective detection of bio-analytes composed by CdSe-QD@Si@AuNPs. Ref. RSC Adv. 2013, 3, 10691.

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