STXM as a tool for studying the morphology of organic semiconducting nanoparticles for energy applications

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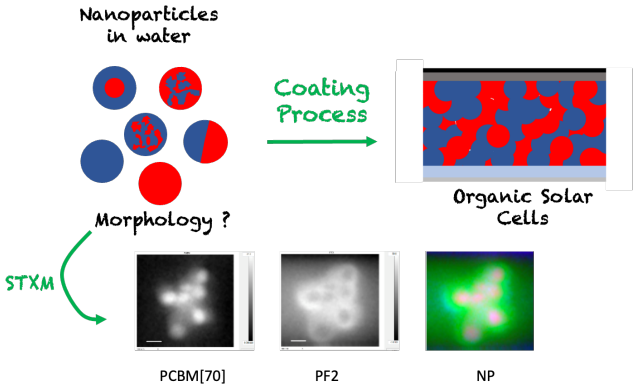
ABSTRACT

Organic semiconducting nanoparticles (NPs), made of electron donor (D) and electron acceptor (A) molecules, are increasingly used in advanced energy applications such as organic photovoltaics (OPV) or photocatalytic hydrogen production. In organic photovoltaics, aqueous suspensions of these NPs are used as an ecofriendly ink to print the active layer of OPV cells. Their internal morphology, fixed during their elaboration process plays a very important role in the device operation. However, this morphology is not so easy to determine by conventional characterization methods available in laboratories, such as TEM, because it does not offer sufficient contrast between the two types of materials, D and A. Soft X-ray Scanning Transmission X-ray Microscopy (STXM) was used to determine the NPs internal morphology. In this technique, a chemical contrast is obtained thanks to differences in the Near Edge X-ray Absorption Fine Structure (NEXAFS) spectra of the 2 materials, offering the possibility to map the chemical composition of the NPs thus showing the donor and acceptor domains as well as their purity. In this presentation, I will show how OSCs NP have been prepared, characterized by STXM and finally used for OPV devices.



REFERENCES

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