

Organic Polymer Films For Photovoltaics : surface chemistry, film processing and nano-structuration for optimised PV properties

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The research laboratory activities are dedicated to the whole chain of knowledge for designing polymer-based materials, i.e. from polymer chemistry and film processing to final properties of materials. As they are 170 persons in this group (70 permanent staff and about 100 Masters, PhD students and Postdoctorants) it is difficult to summarize all the research field but the final goal of our team is to establish relationships between nano-structures, morphologies, and properties of polymer-based materials such as polymers, polymer composites and hybrid organic-inorganic materials. The architecture and morphologies are tailored from various chemistry routes which can be combined with physical phenomena such as phase separation or crystallization processes, through the control of processing parameters. Investigations are in particular focused on the role of interfaces in composites and multi-layered films. The relationships between chemical structures, morphologies and physical properties are obtained experimentally and modelled for an efficient feedback to the chemistry and formulation approaches and to the optimisation of the processing strategy.

The work undertaken by laboratory and often in collaboration with industries, in the field concerned by the topic "Towards Organic Photovoltaics" can give several challenges for the future in the following fields of interest:

- . Chemistry : in-situ generation of functional fillers (ZnO, TiO_x) in polymer matrix, fillers and surface (Polymer-ITO) functionalization by RAFT, click-chemistry (SWNT, Si Nanowires), nanostructured materials

- . Environmentally Friendly Film : in situ monitoring of processing (microdielectrometry, NIR IR); low temperature processes; latex formulation for industrial applications and solution processable materials; thin film (transparent PET- conductive layer to replace ITO), functional coatings, UV coatings, adhesives.....

- . Properties : control of the properties by the morphology for application to the nanostructuration; flexibility, electronic, optoelectric and dielectric (ex :devices : low or high K, solar cells...), barrier, life Cycle (aging, recycling...)

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