

# Towards bulk heterojunction solar cells with a controlled active layer morphology.



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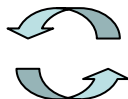
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## Motivations

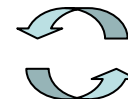
- Improve the understanding and enhance the control of solution-processed donor-acceptor interpenetrating networks.
- Allow elaboration of optimised, thermodynamically stable bulk heterojunction devices.

## Scientific approach

**Synthesis** of novel conjugated polymers with appropriate properties : self-assembling ability, HOMO-LUMO, charge transport,...

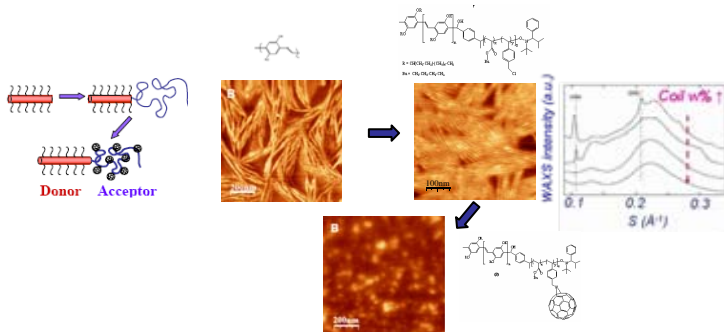


- Investigate the **nanostructure** of bulk and thin films.
- Use as dopant to control the morphology of polymer/fullerene blends
- Evaluate the **optical** and **electronic** properties (by time of flight, OFET, SCLC,...)

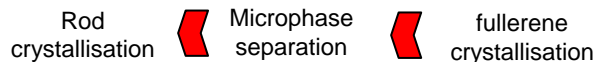


Elaborate and characterize **PV device** with optimized active layer morphology:  
→ Improve efficiency, identify limiting factors

## Self-assembly of DEH-PPV – P(BA-stat-C<sub>60</sub>MS) rod-coil block copolymers, versus molecular structure:



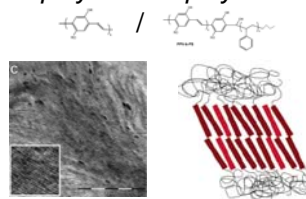
Active mechanisms:



S. Barrau, *Macromolecules* 2008, to be published.

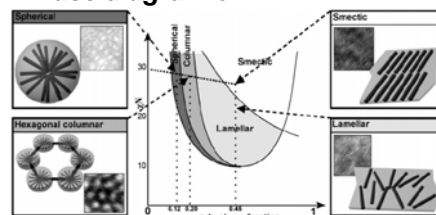
## Illustrating results

### Nanostructure of homopolymer / copolymer blends



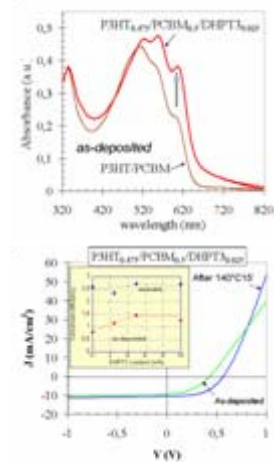
N. Sary, *Macromolecules* 2007, **40**, 3277

### Phase diagram of DEHPPV-P4VP



N. Sary, *Macromolecules* 2007, **40**, 6990

## Influence of DHPT3 on P3HT crystallisation and PV performance in P3HT/PCBM blends



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