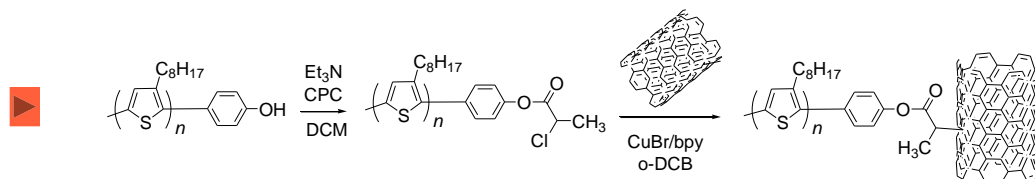


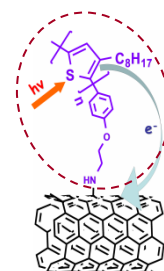
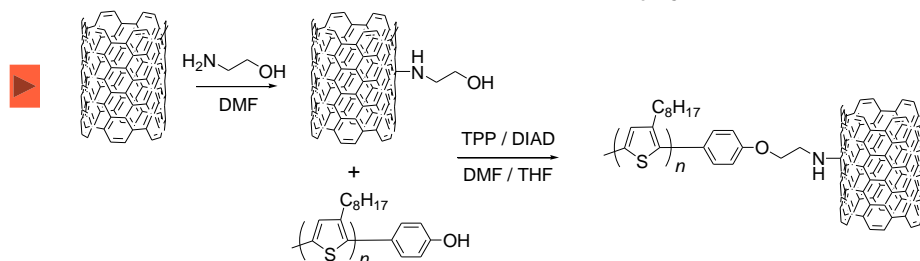
# Carbon allotrope - Semiconducting Polymer Hybrids

decoration of SWCNTs: "grafting to" / "grafting from"

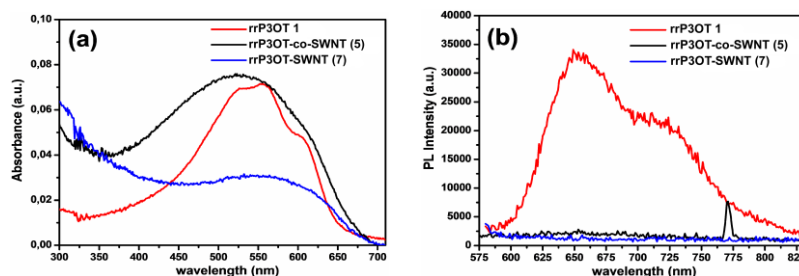
*rr*- poly(3-alkyl-thiophene)s covalently attached onto carbon nanotubes



"grafting to"



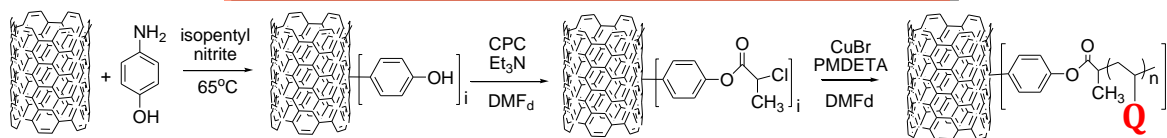
solid state UV-Vis and PL spectra



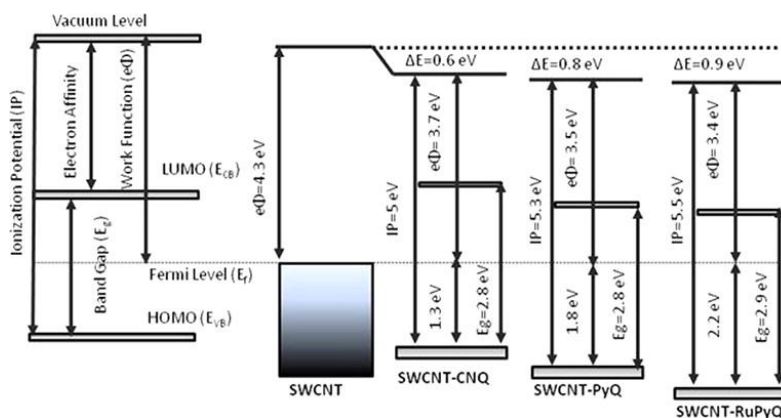
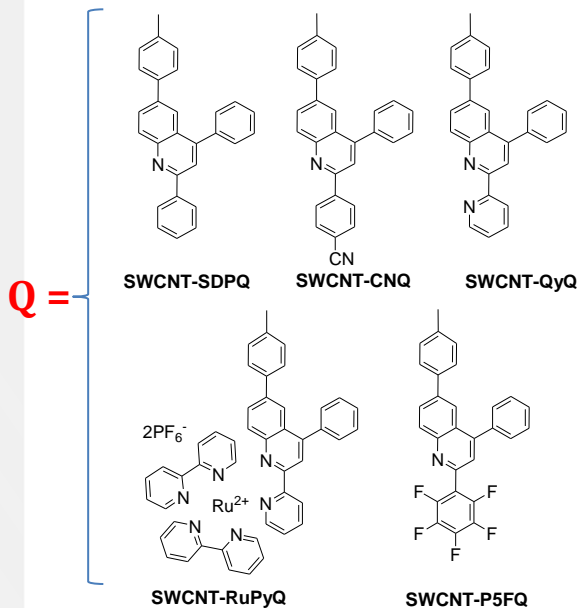
electron transfer from the *rr*- poly(3-octylthiophene) to the SWCNTs

A. A. Stefopoulos, C. L. Chochos, M. Prato, G. Pistolis, K. Papagelis, F. Petraki, S. Kennou, J. K. Kallitsis, *Chem. Eur. J.* **2008**, *14*, 8715

functional poly(quinoline)s covalently attached onto carbon nanotubes



"grafting from"



Schematic diagram of the pristine SWCNTs and the hybrid materials energy bands as measured by UPS and energy gaps calculated from the UV-Vis-NIR spectra and the corresponding LUMO positions

C.L. Chochos, A.A. Stefopoulos, S. Campidelli, M. Prato, V.G. Gregoriou, J.K. Kallitsis, *Macromolecules*, **2008**, *41*, 182

A.A. Stefopoulos, S.N. Kourkoulis, S. Economopoulos, F. Ravani, A. Andreopoulou, K. Papagelis, A. Siokou, J.K. Kallitsis, *Macromolecules*, **2010**, *43*, 4827

S.N. Kourkoulis, A. Siokou, A.A. Stefopoulos, F. Ravani, T. Plocke, M. Müller, J. Maultzsch, C. Thomsen, K. Papagelis, J.K. Kallitsis, *Macromolecules*, **2013**, *46*, 2590

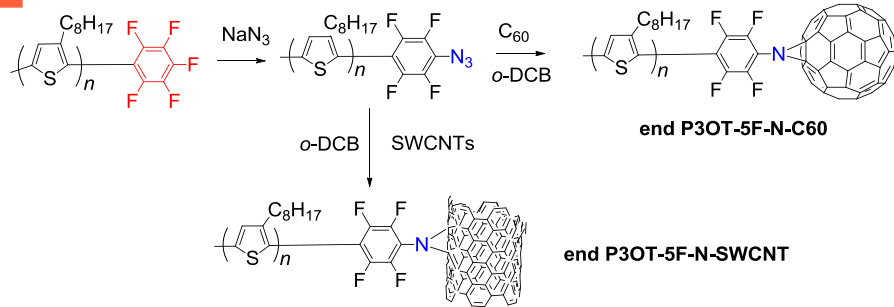
# Carbon allotrope - Semiconducting Polymer Hybrids

carbon allotrope - perfluorophenyl functionalized semiconductors

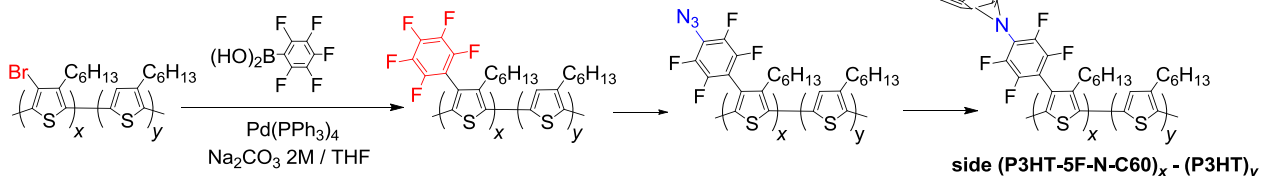
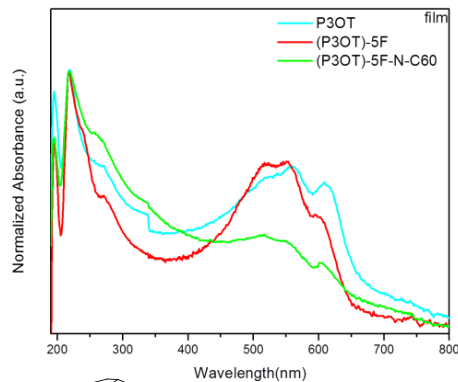
azide cycloaddition onto the  $sp^2$  surface of carbon allotropes

## hybrid electron donors

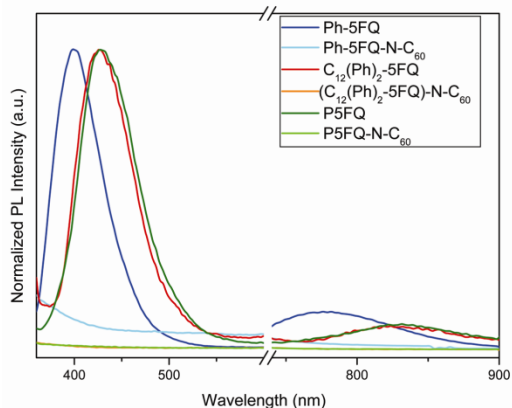
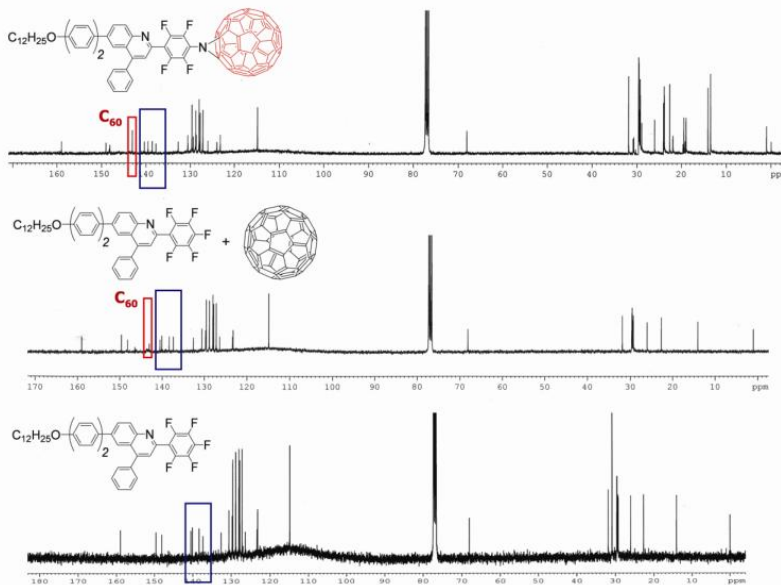
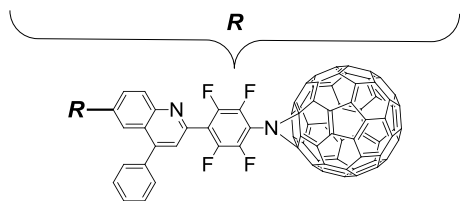
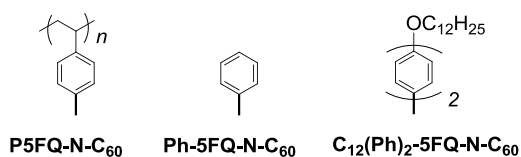
"grafting to"



end-P3OT-5F-N-C60: UV-Vis in film form



## hybrid electron acceptors



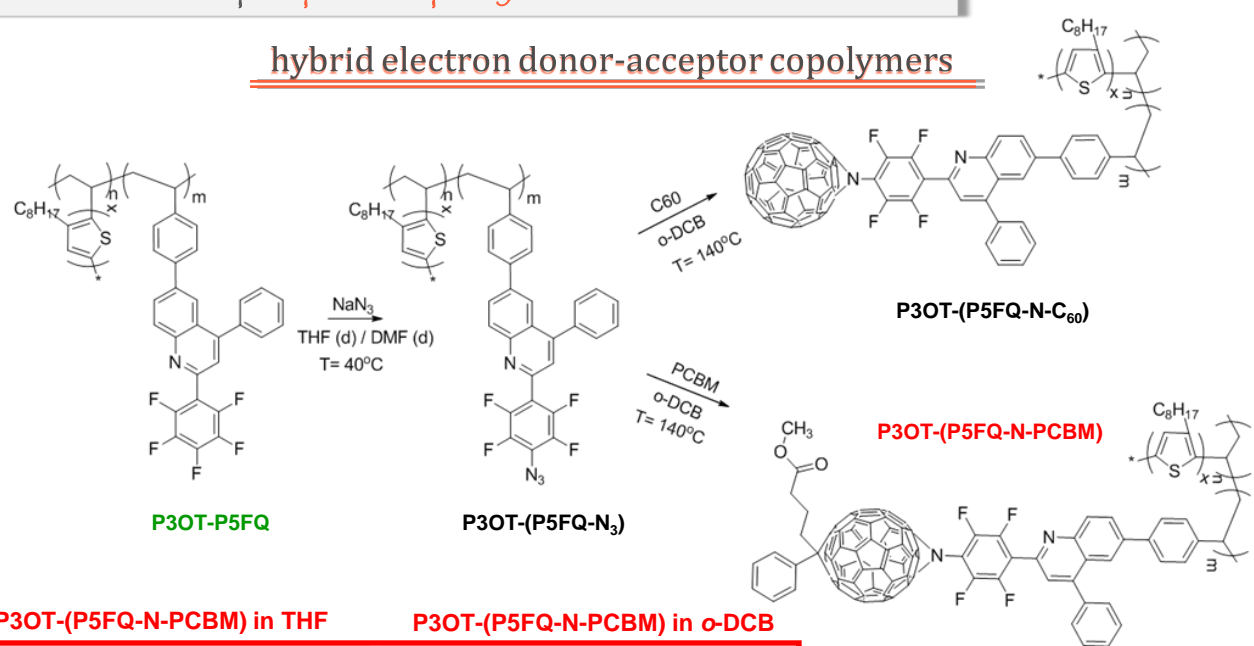
PL spectra of Ph-5FQ, Ph-5FQ-N-C<sub>60</sub>, C<sub>12</sub>(Ph)<sub>2</sub>-5FQ, C<sub>12</sub>(Ph)<sub>2</sub>-5FQ-N-C<sub>60</sub>, P5FQ, P5FQ-N-C<sub>60</sub> in film form after excitation at 340nm

**Quinolines' photoluminescence quenching**

# Carbon allotrope - Semiconducting Polymer Hybrids

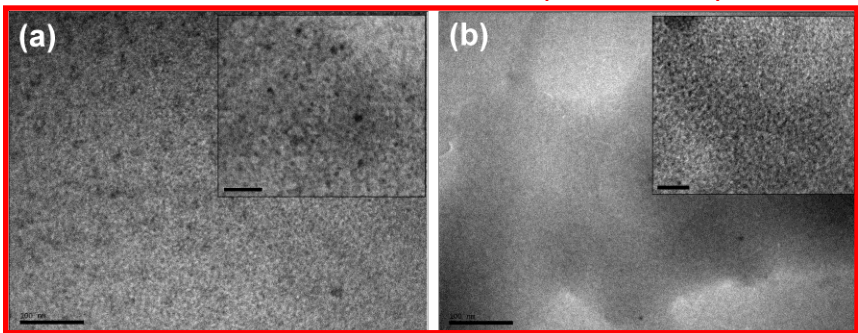
carbon allotrope - perfluorophenyl functionalized semiconductors

## hybrid electron donor-acceptor copolymers

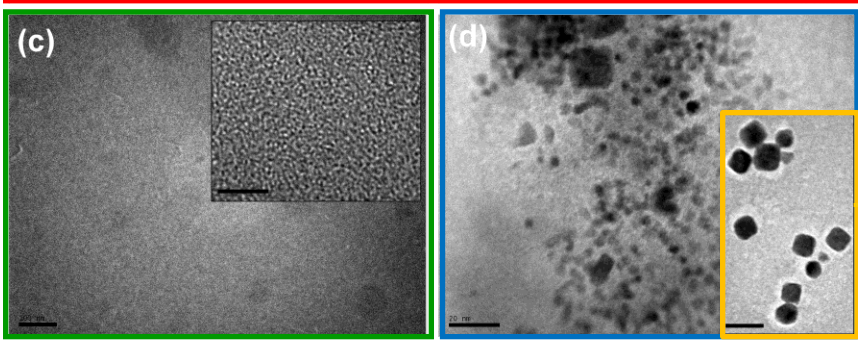


**P3OT-(P5FQ-N-PCBM) in THF**

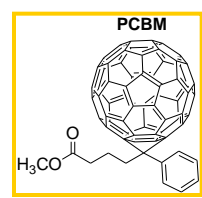
**P3OT-(P5FQ-N-PCBM) in o-DCB**



- smaller nano-phase segregated domains in o-DCB
- preserved nano-phase separation of initial copolymers

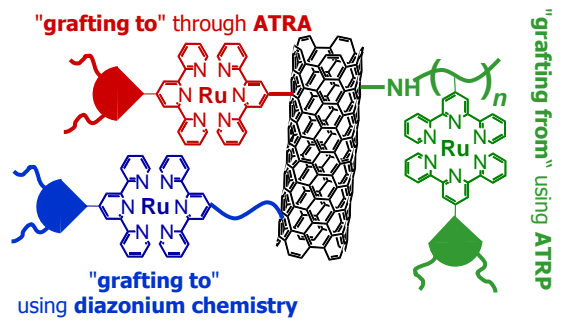


blend of P3OT-P5FQ:PCBM 75:25 wt% in o-DCB

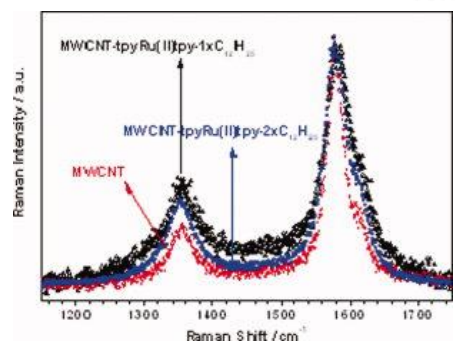


**P3OT-P5FQ in o-DCB**

## Terpyridine-Ru(II) MetalloComplexes onto carbon nanotubes



## MWCNTs & SWCNTs



- Raman spectra of:
- pristine MWCNTs
  - MWCNT-tpyRu(II)tpy-2xC<sub>12</sub>H<sub>25</sub>
  - MWCNT-tpyRu(II)tpy-1xC<sub>12</sub>H<sub>25</sub>