



ESR2. Synthesis and use of novel functionalised materials

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Dublin City University

OrgBIO kick-off meeting

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OÉ Gaillimh
NUI Galway





ESR2. Synthesis and use of novel functionalised materials

Host Institution : Dublin City University

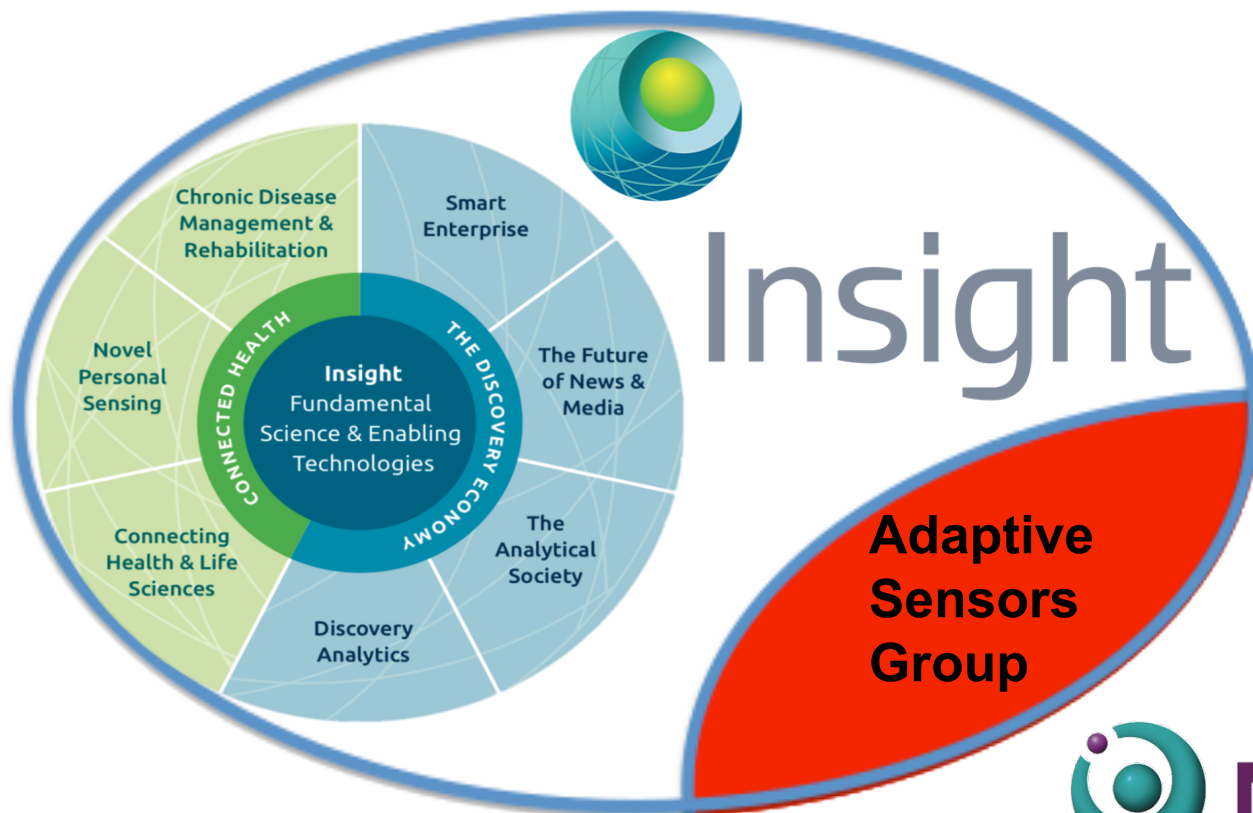


PhD Student Alexandru Tudor
Recruited: January 2014



Prof. Dermot Diamond
Supervisor





Insight

Adaptive Sensors Group



NCSR

National Centre for Sensor Research





OrgBIO - WP1

WP 1: Materials, Processes and Technologies for organic bioelectronics

➤ WP2, WP3, WP4

Main Objective

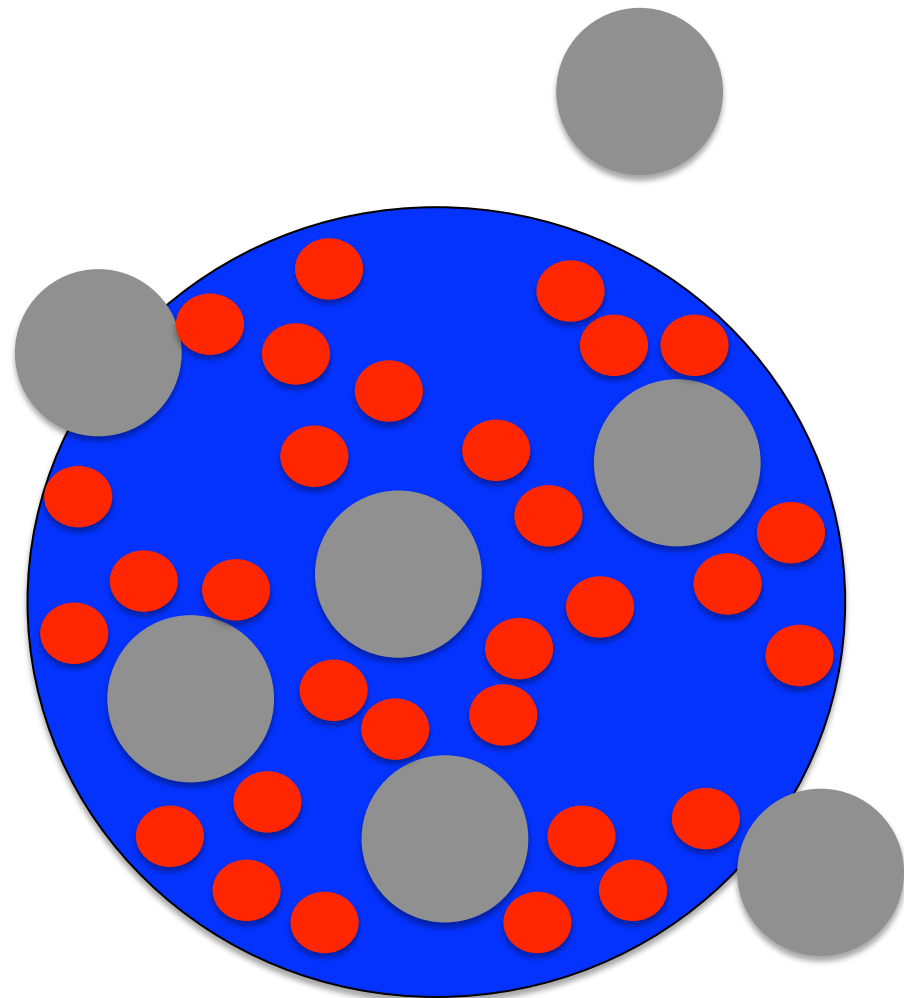
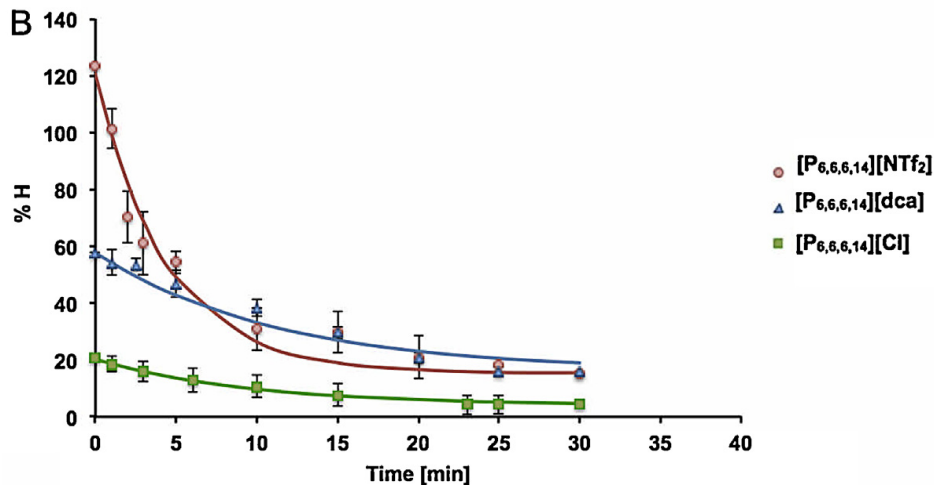
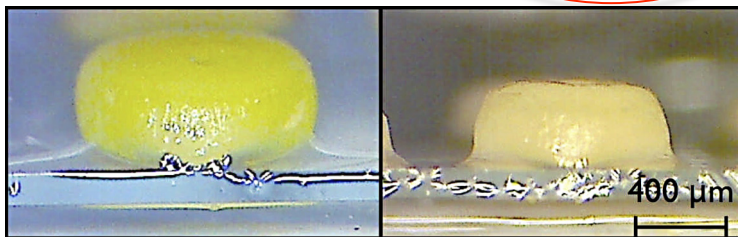
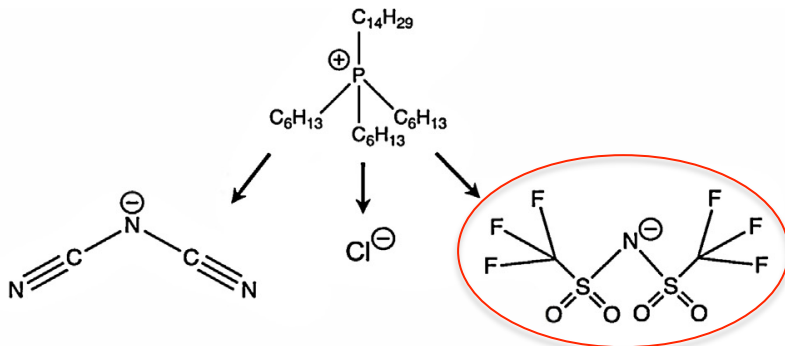
- Design, synthesis, development and deposition of materials for organic bioelectronics.

This includes: synthesis and use of novel functionalised materials, synthesis and supply of new polymer materials, organic semiconductor based on solutions, nanomaterials for production of nanodevices with a diagnostic role. Compatibility with devices and large scale manufacturing techniques will be considered.

Task 1A. Novel organic materials and polymers (POLYMAT, DCU, UNIBA)

- Testing and integration of light activated polymer valves (DCU).
- Development of nanostructured conducting polymers and nanocomposites (POLYMAT, DCU).
- Development and provision of biocompatible organic ionogels (DCU).

1. Testing and integration of light activated polymer valves

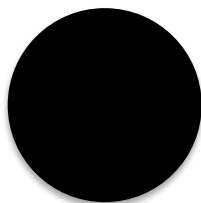


Czugala et al., Sens. Act. B, 2013, DOI 10.1016/j.snb.2013.12.072.



1. Testing and integration of light activated polymer valves

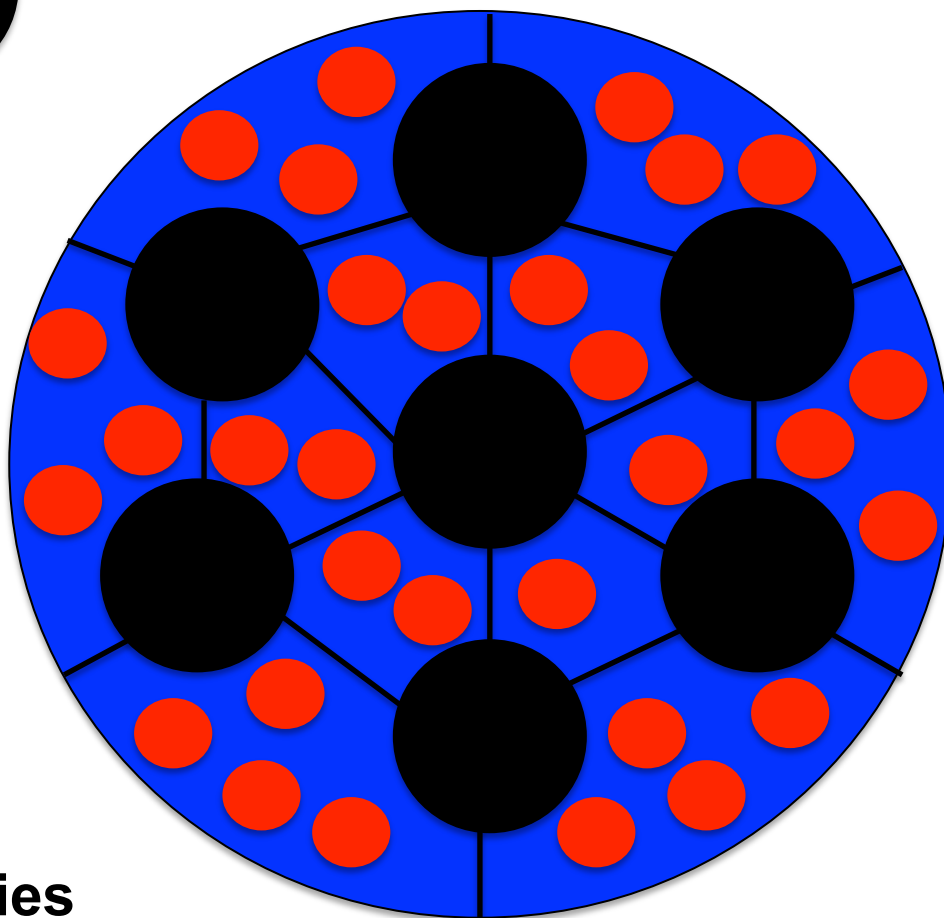
Monomeric Ionic Liquid =



Linear photo-actuator =



Crosslinker =
(PPO 800)



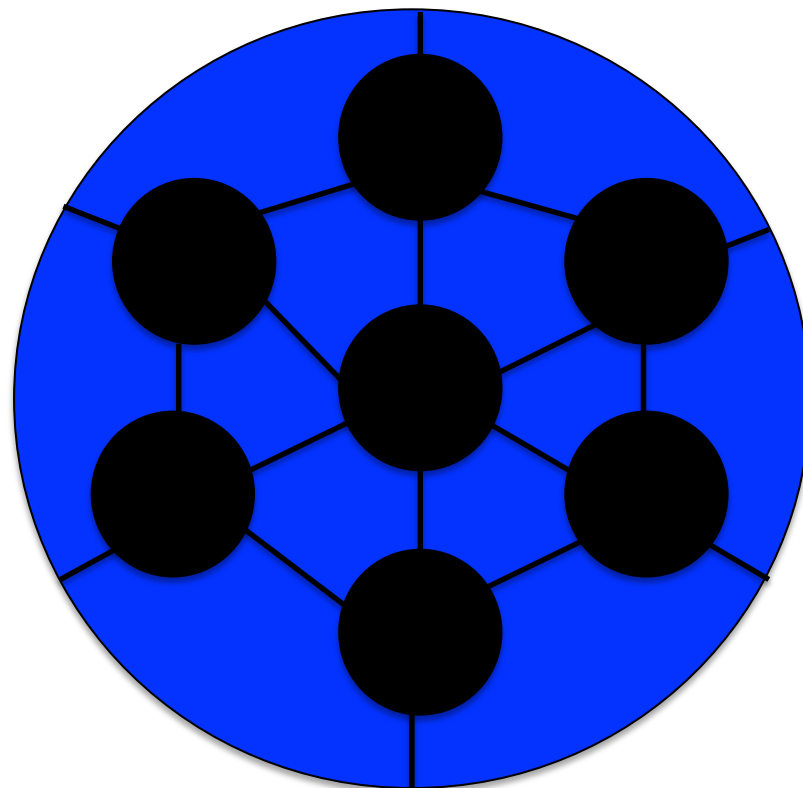
Advantages

- Ever-present liquid phase
- Enhanced swelling/shrinking
- Improved mechanical properties





- **Conductive Matrix**
- **Incorporation of other conductive materials (conductive polymers)**



2. Development of nanostructured conducting polymers and nanocomposites (POLYMAT, DCU).





3. Development of biocompatible organic ionogels

▪ Collaboration with Prof. R. M. Owens and Prof. G. Malliaras

- Previously demonstrated the application of ILs as electrolytes for the development of OECTs for sensing glucose [1] and lactic acid [2].
- IL incorporation into a polymeric matrix (an ionogel) to achieve a solid-state electrolyte [2].
- Synthesis of biocompatible hydrated choline ionic liquids [3].

[1] S. Y. Yang, F. Cicoira, R. Byrne, F. Benito-Lopez, D. Diamond, R. M. Owens and G. G. Malliaras, *Chem. Commun.*, 2010, 46, 7972–7974.

[2] D. Khodagholy, V. F. Curto, K. J. Fraser, M. Gurfinkel, R. Byrne, D. Diamond, G. G. Malliaras, F. Benito-Lopez and R. M. Owens, *J. Mater. Chem.*, 2012, 22, 4440–4443.

[3] Curto, V. F., Scheuermann, S., Owens, R. M., Ranganathan, V., MacFarlane, D. R., Benito-Lopez, F., & Diamond, D. *PCCP*, 2014, 16, 1841-1849.





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Thank you !

