Researcher Background

Michael Zaworotko, PI

- Bernal Chair of Crystal Engineering
- Born in Wales in 1956
- Associate Editor for *Crystal Growth & Design* (ACS)
- Fellow of Royal Society for Chemistry, AAAS, Learned Society of Wales and Institute of Chemistry of Ireland

Research Field

Crystal engineering is the field of chemistry that studies the design, properties and applications of new crystalline materials.

- A new paradigm to design novel materials with far superior performance vs. existing materials
- Driven by an iterative loop between modeling, structural characterisation and properties
- Interdisciplinary collaborations are critical

Scientific Impact

- > 370 peer-reviewed publications and review articles
- www.highlycited.com in 2014, 2015 and 2016
- 20th most impactful chemist in world in 2011
- H-index of 86
- > 35,000 citations
- 12 patents issued (7 licensed), > 10 pending
- > 300 invited seminars or lectures

Technological Impact

Crystal engineering enables innovative technologies where materials properties drive applications, e.g.

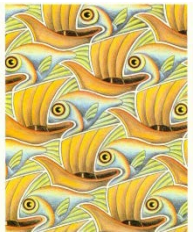
- Pharmaceuticals: low cost, low risk, high reward routes to improved medicines (drug substances)
- Porous materials: less energy intensive commodity separations; new technologies for chiral separation; new carbon negative technologies; advanced sensors

Researcher Programme

Pharmaceutical Materials

Goal: Ionic cocrystals for use in medicines.
Why: Ionic cocrystals can greatly change properties such as solubility and stability without changing chemical structure of a drug molecule = 505(b)(2)

Who: Dr. Ewa Patyk-Kazmierczak and a team of post-grad students



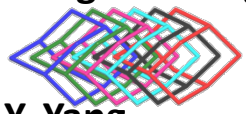
Rigid Porous Materials

Goal: Porous materials for commodity purification.
Why: Advanced porous materials can cut carbon capture costs by 90%, enable new carbon negative technologies and reduce commodity costs.

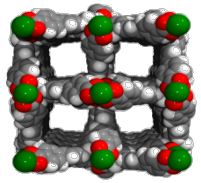
Who: Dr. David Madden and a team of post-docs and postgrad students

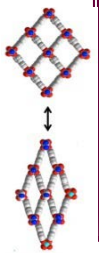
Flexible Porous Materials

Goal: Structures that breathe and flex when exposed to stimuli, e.g. pressure or heat.
Why: Flexible materials will revolutionise gas storage, including natural gas storage.



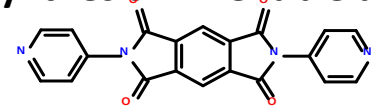
Who: Dr. Q.-Y. Yang and a team of post-graduate students





Green Chemistry

Goal: Synthesis of new functional molecules in high yield with no waste.
Why: Greater molecular diversity and low cost of synthesis will enable a wider range of applications.



Who: Ms. Rana Sanii and a team of post-graduate students