

Dr Neil Robertson
Reader in Inorganic and Materials Chemistry

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Research Interests: molecular materials, dye-sensitised solar cells, luminescent materials, conducting/magnetic materials



Our research involves molecule-based materials with conducting, magnetic and optical properties. This includes preparation of electronically-delocalized molecules with properties such as reversible redox processes, intense low-energy absorptions and the capability for strong intermolecular interactions. These are then used to prepare functional electronic materials. Such materials and devices have the potential to be more cheaply fabricated in comparison with conventional semiconductor technology and as such are set for widespread application in areas such as displays, transistors and solar cells. The molecules we synthesize include both transition metal complexes and extended-aromatic organic molecules. We use these molecules to prepare conducting materials, magnetic materials and solar cells and characterize these by measuring properties such as magnetic susceptibility, conductivity, charge mobility and light-to-electricity conversion efficiency of solar cells. We work with a range of UK and international collaborators in universities and industry for more specialist characterization of our devices.

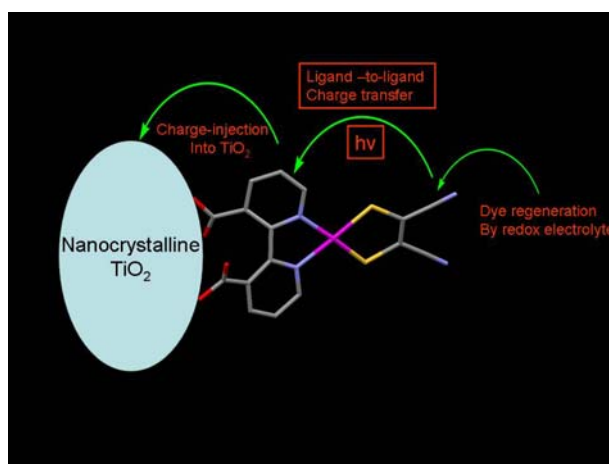


Figure: The charge separation process in a dye-sensitised solar cell using a Pt-based dye synthesised in our lab.⁴ The dye binds to nanocrystalline TiO₂ through carboxylate groups on the bipyridyl ligand.

Selected Recent Publications

1. Somchai Tancharakorn, Francesca P. A. Fabbiani, David R. Allan, Konstantin V. Kamenev, Neil Robertson, Combined magnetic and single-crystal X-ray structural study of the linear chain antiferromagnet [(CH₃)₄N][MnCl₃] under varying pressure, *J. Am. Chem. Soc.* 2006, **128**, 9205
2. Neil Robertson, Catching the Rainbow: Light Harvesting in Dye-Sensitised Solar Cells, *Angew. Chemie.*, 2008, **47**, 1012
3. Sarah S. Staniland, Wataru Fujita, Yoshikatsu Umezono, Kunio Awaga, Stewart J. Clark, HengBo Cui, Hayao Kobayashi and Neil Robertson, A Unique New Multiband Molecular Conductor: [BDTA][Ni(dmit)₂]₂ *Chem. Commun.*, **2005**, 3204
4. Elaine A. M. Geary, Lesley J. Yellowlees, Lorna A. Jack, Iain D. H. Oswald, Simon Parsons, Narukuni Hirata, James R. Durrant, Neil Robertson, Synthesis, structure and properties of [Pt(II)(diimine)(dithiolate)] dyes with 3,3', 4,4' and 5,5' – disubstituted bipyridyl: Applications in dye-sensitised solar cells, *Inorg. Chem.* 2005, **44**, 242
5. Simon Dalgleish, Neil Robertson, A Stable Near IR Switchable Electrochromic Polymer Based on an Indole-Substituted Nickel Dithiolene, *Chem. Commun.*, **2009**, 5826
6. Omar Moudam, Brenda. C. Rowan, Mohammed Alamiry, Patricia Richardson, Bryce. S. Richards, Anita C. Jones, Neil Robertson, Europium Complexes with High Total Photoluminescence Quantum Yields in Solution and in PMMA, *Chem. Commun.*, **2009**, 6649