

2 March, 2pm
(Ingram Lecture Theatre)

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From Organic Solar Cells to
Dynamic Chemical Systems

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This talk will give an overview on our activities in two fields of chemical research: i) the synthesis of functional materials and ii) the study of complex dynamic systems.

Organic solar cells, which offer appealing benefits such as semi-transparency and device flexibility, have recently emerged as a promising alternative to the traditional silicone-based technology.^[1] We have contributed to this area by synthesizing a class of “nitrogen-doped” football-shaped molecules, which, as we had anticipated, gave rise to improved photovoltaic short circuit current (J_{sc}) when compared to benchmark devices.^[2] Most recently, we have embarked on a detailed investigation of the degradation mechanisms in such solar cells, which led us to propose strategies for minimizing the typically observed losses in device performance.

^[3]

Over the last decade, a rapidly growing group of chemists has shifted their focus from the study of pristine compounds to the study of complex dynamic systems.^[4] This talk will give a general introduction to this emerging area, which is sometimes called “systems chemistry” to highlight the similarity to related subdisciplines in physics and biology. With the development of a reversible chemical reaction termed orthoester exchange, we have introduced a new method to this area and studied its suitability for producing unexpected “systems behaviour”.^[5] Finally, I will present our studies on a new class of self-assembled, dynamic cage compounds (Figure) and discuss their possible uses in drug delivery and battery technology.^[6]



- [1] M.-E. Ragoussi, T. Torres, *Chem. Commun.* **2015**, 51, 3957.
- [2] W. Cambarau, U. F. Fritze, A. Viterisi, E. Palomares, M. von Delius, *Chem. Commun.* **2015**, 51, 1128.
- [3] T. Heumüller, M. von Delius, C. J. Brabec et al. *Energy Environ. Sci.* **2016**, 9, 247.
- [4] E. Mattia, S. Otto, *Nature Nanotech.* **2015**, 10, 111.
- [5] R.-C. Brachvogel, M. von Delius, *Chem. Sci.* **2015**, 6, 1399.
- [6] R.-C. Brachvogel, F. Hampel, M. von Delius, *Nature Commun.* **2015**, 6, 7129.