

Cambridge Centre for Carbon Reduction in Chemical Technology (C4T)



Programme Leader



Prof Markus Kraft,
University of Cambridge

Prof Markus Kraft is a Professor in the Department of Chemical Engineering and Biotechnology in Cambridge. He has a strong interest in the area of computational modelling and optimisation targeted towards developing carbon abatement and emissions reduction technologies for the automotive, power and chemical industries.

C4T started in April 2013 and is the first programme for the Cambridge Centre for Advanced Research and Education in Singapore Ltd (CARES). Funded by the National Research Foundation (NRF) under its Campus for Research Excellence and Technological Enterprise (CREATE) programme, this is a collaboration between the University of Cambridge, NTU and the NUS.

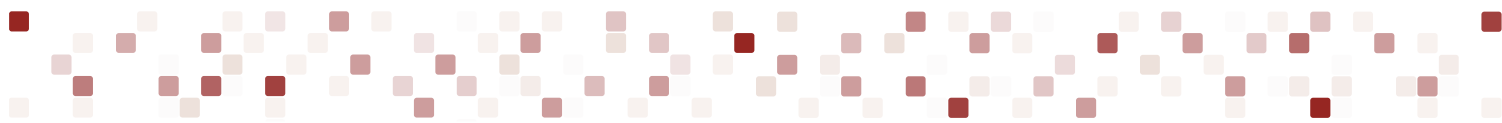
Research

The C4T research focus is on minimising the carbon footprint of industrial-scale chemical processes. In particular, the team examines ways of improving energy efficiency and

explores strategies for carbon capture and use in the petrochemical and refining technologies. In a wider context, the assessment and abatement of the carbon footprint of the integrated petro-chemical plants and electrical network on Jurong Island in Singapore will be addressed.

The four research projects are:

- IRP1 Multi-Scale Studies of Catalytic and Adsorption Technologies;
- IRP2 Electrochemical Multi-Scale Science, Engineering & Technology;
- IRP3 Carbon Abatement in the Petroleum Refining Industry – a Control and Optimisation Research Network;
- IRP4 Integrated Chemical and Electrical Systems Operation.



Researchers

There are currently a total of 110 researchers in C4T, including Co-Principal Investigators (Co-PIs), Research Fellows and PhD students working at the University of Cambridge, Nanyang Technological University and the National University of Singapore. Leading the research teams are a total of thirteen Principal Investigators (PIs), five of which hold appointments at Cambridge, four at NTU and four at NUS. All PIs are well-known experts in their fields.

Highlights

The J-Park Simulator (JPS)

JPS is the overarching flagship activity of the C4T research programme – an AI platform for scenario analysis in the chemical industries, industrial parks and networks, brings together for the first time cross-domain modelling and data storage with an ontology-based expert system to produce a next-generation tool for the design, analysis and operation optimisation of eco-industrial parks. From the chemical processes to the electricity grid and from building management to molecular reactions, JPS provides clear, visual information to support optimisation, decision making and scenario analysis.

Recent Publications, Awards and Events

- Prof Hua Chun Zeng (PI, NUS, IRP1) and Dr Guowu Zhan (RF, NUS, IRP1) recently achieved a research breakthrough in the field of nanocatalyst fabrication, and this work is currently highlighted in American Chemical Society's top journal ACS Central Science: Smart Nanocatalysts with Streamline Shapes. *ACS Cent. Sci.*, 2017, 3 (7), pp 794–799.
- ACS Editor's Choice - Investigating the Role of Tunable Nitrogen Vacancies in Graphitic Carbon Nitride Nanosheets for Efficient Visible-Light-Driven H₂ Evolution and CO₂ Reduction. Wenguang Tu, You Xu, Jiajia Wang, Bowei Zhang, Tianhua Zhou, Shengming Yin, Shuyang Wu, Chunmei Li, Yizhong Huang, Yong Zhou, Zhigang Zou, John Robertson, Markus Kraft (PI, IRP3), and Rong Xu. *ACS Sustainable Chem. Eng.*, 2017, 5 (8), pp 7260–7268.
- C4T laboratory receives the Building and Construction Authority Green Mark Platinum Award for Laboratories – June 2017.
- C4T demonstrates J-Park Simulator, the next generation modelling tool for eco-industrial parks at the 'Science is Great' event hosted at the British High Commission – June 2017.

**For more information about the C4T programme, please
email: cares@hermes.cam.ac.uk or visit: www.cares.cam.ac.uk**

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