Annual EPSRC Centre Open Day 2012

"Welcome to the first annual Open Day of the EPSRC Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation. The Centre was established in 2011 thanks to significant support from EPSRC, a large number of companies including major multinational end-users as well as SME technology providers and from the collaborating universities. Our shared vision is to accelerate the adoption of continuous manufacturing processes, systems and plants for the production of high-value chemical products including pharmaceuticals, dyes and pigments, energetic materials and others. Clearly, addressing the significant engineering and physical science challenges across the national Centre's scope requires a collaborative, interdisciplinary effort and our inaugural Open Day is aimed at introducing national and international activities in this area as well as highlighting opportunities to engage further with the exciting programme moving forward."

Prof Alastair Florence,

Centre Director

Annual EPSRC Centre Open Day 2012

Programme

Thursday 13th September, Barony Hall, University of Strathclyde

Morning Session

09:30 – 10:00 - Glass covered Walkway and Winter Gardens
Attendee registration and coffee

10:00 – 10:20 – Great Hall
Welcome, Introduction and Centre Overview
Professor Alastair Florence, Session Chair

10:20 – 10:45 – Great Hall
'Control of size and shape distribution in continuous crystallisation systems'
Professor Zoltan Nagy, Loughborough University and Purdue University

10:45 – 11:10 – Great Hall
'High resolution video imaging as a crystallization tool'
Dr Cameron Brown, Heriot-Watt University

11:10 – 11:40 – Great Hall & Transept
Tea / coffee and posters

11.40 – 12:05 – Great Hall
'Going against the flow, an Astra Zeneca perspective'
Dr Jon-Paul Sherlock, AstraZeneca

12:05 – 12:50 – Great Hall
Keynote: 'Flow chemistry as an improved approach to multi-step synthesis'
Professor Ian Baxendale, University of Durham

12:50 – 14:30 – Great Hall & Transept
Lunch and poster session

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Programme

Thursday 13th September, Barony Hall, University of Strathclyde

Afternoon Session

14:30 – 14:40 - Great Hall

Mr Craig Johnston, Session Chair

14:40 – 15:00 – Great Hall

Remarks from Dr. Richard Bailey, EPSRC and Dr Clive Badman OBE, CMAC Chair and GlaxoSmithKline

15:00 – 15:25 – Great Hall

'Developing Pharmaceutical Continuous Crystallization Processes - Knowledge & Gaps'
Dr Chris Price, GlaxoSmithKline

15:25 – 15:50 – Great Hall

'Exploring alternative product-process Supply Networks Models in Pharma'
Dr Jag Srai, University of Cambridge

15:50 – 16:20 – Great Hall & Transept

Tea / coffee and posters

16: 20 – 17:05 - Great Hall

Keynote: 'Multiscale design models for continuous agglomeration processes for delivery form manufacture'
Professor Jim Litster, Purdue University

17:05 – 17:30 - Great Hall

Session close and round-up
Remarks from the Principal, Professor Sir Jim McDonald with poster prize presentation

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Thursday 13th September, Barony Hall, University of Strathclyde

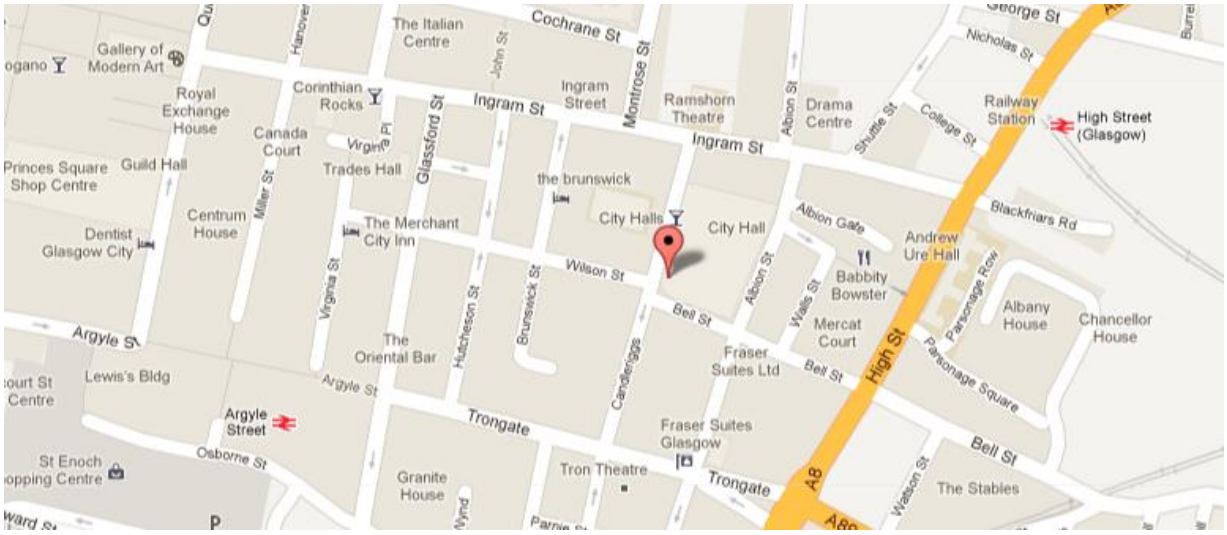
Evening

17:30 – 18:30 - Winter Gardens

Wine reception and music composed for the RSC as part of the International year of Chemistry.

19:30

Dinner, Arisaig, Merchant Square, Merchant City.



Annual EPSRC Centre Open Day 2012

Speaker's biographies

Prof Alastair Florence, EPSRC Centre Director

Alastair Florence is the Director of the EPSRC Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation and a Professor of Pharmaceutical Sciences at the Strathclyde Institute of Pharmacy and Biomedical Sciences at the University of Strathclyde. As a pharmaceutical scientist, he has expertise in crystallisation and crystallisation screening of pharmaceuticals and other molecular solids and in approaches to the discovery, characterisation and control of physical forms including polymorphs, solvates, salts, co-crystals and amorphous solids. A key focus is on the physical analysis of crystalline and polycrystalline solids to study the influence of crystallisation conditions, processing, temperature and other factors on their structure and properties in pure and formulated states.

Prof Zoltan Nagy, EPSRC Centre, Loughborough University and Purdue University

Zoltan K Nagy is a Professor of Process Systems Engineering at the Chemical Engineering Department at Loughborough University, where he leads the research in the area of Pharmaceutical and Crystallisation Systems Engineering and Process Control. He is also a Professor of Chemical Engineering at Purdue University. His research interests include pharmaceutical systems engineering, modeling, monitoring, optimization and control of chemical processes in particular crystallization systems, and process analytical technologies. He is subject editor (pharmaceutical engineering) for Chemical Engineering Research and Design, and associate editor for Control Engineering Practice.

Dr Cameron Brown, EPSRC Centre, Heriot-Watt University

Cameron Brown is currently a research associate for the EPSRC Centre of Innovative Manufacturing in Continuous Manufacturing and Crystallisation within the Institute of Mechanical, Process and Energy Engineering at Heriot-Watt University. His current research is primarily focused on the development of process analytical tools for monitoring crystallization in continuous oscillatory baffled reactors.

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Speaker's biographies

Dr Jon-Paul Sherlock, Director Physical Sciences, AstraZeneca

Jon-Paul Sherlock received his chemical engineering degree and PhD from UMIST before joining Zeneca in the Process Technology Department at Huddersfield in 1997. He provided technical support to pilot plant campaigns before moving to Grangemouth to finalise the design, commission and start up a large volume agrochemical production facility. In 2001, he joined AstraZeneca Process R&D, Charnwood, to establish process engineering in drug substance process development at the site. He was responsible for the development and exploitation of a purpose built process engineering laboratory and the management of a team of process engineers and scientists. Following a period in drug development project management in the respiratory area, Jon-Paul became Head of Process Engineering in 2008 for one of the UK development sites and then in 2010 became Director, Physical Science UK/US in the new Pharmaceutical Development function. He leads a multi-skilled group of scientists and engineers driving understanding of materials and product performance. Jon-Paul was awarded the IChemE Hanson Medal for his article on "10 things chemists should know about engineers", is a Fellow of the IChemE and a Board member of the BRITEST and CMAC consortia.

Professor Ian Baxendale, University of Durham

Ian Baxendale is a Professor in the Department of Chemistry at Durham University. His primary research direction is the synthesis of biologically potent molecules which encompasses the design, development and integration of new processing techniques for their preparation and solving challenges associated with the syntheses of new pharmaceutical and agrochemical compounds.

Craig Johnston, EPSRC Centre Industrial Director

Craig Johnston is the Operations Director of CMAC and the Industrial Director of the EPSRC Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation and. is a fellow of the Institute of Chemical Engineers. His industrial career spans 22 years, working for ICI, Zeneca, Avecia and Fujifilm. Roles included technical, production, start-up management and technology leadership. Responsibilities included new product introduction, process improvement, project definition, capital expenditure and novel process technology evaluation. He was a board director with Britest Ltd (2006-2011) an industry / academic consortium focussed on adding value through process understanding and design. He is currently chair of Chemical Sciences Scotland Innovation Group.

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Speaker's biographies

Dr Richard Bailey, Senior Sector Manager, EPSRC

Richard has worked at EPSRC for over 9 years, during which time he has worked for the Engineering, Manufacturing, Infrastructure & Environment, Chemistry, eScience, Transformative Research and Digital Economy programmes. As Senior Sector Manager for Transport Vehicles and Systems, he co-ordinates EPSRC interactions with the transport sector. Richard has a PhD from UMIST in Instrumentation and Analytical Chemistry.

Dr Clive Badman OBE, Vice President, Investigational Material Supply, GlaxoSmithKline

Clive Badman took up the position of Vice President, Investigational Material Supply, in R&D, in May 2010. He is responsible for the supply chain for clinical trials worldwide and the scale up and transfers of products into manufacturing. Clive joined Beecham Pharmaceuticals in 1978 and has held positions of increasing responsibility in Development and Production both at site and in central functions. Clive has a BSc and PhD in Chemistry from Dundee University and is a Visiting Professor at Strathclyde University and Chairman of CMAC (Continuous Manufacturing and Crystallisation). He was awarded an OBE in 2012

Dr Chris Price Manager, Particle Generation, Control & Engineering GSK Stevenage & Harlow

Chris Price manages a multi-functional team at GSK responsible for; particle science, process engineering, process analytics and continuous processing aspects of new drug development at the interface between chemistry and formulation. Throughout his career he has lead research programmes in batch and continuous crystallization, measurement of crystallization kinetics, particle engineering and sonocrystallization, in-situ crystallization monitoring and control, automated filtration and washing and accelerated process development linking chemical and pharmaceutical development. Chris received his BSc in Chemistry from the University of York and his MSc and PhD in Chemical Engineering specialising in crystallisation from Manchester University.

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Speaker's biographies

Dr Jag Srai, EPSRC Centre, University of Cambridge

Jag is Head of the Centre for International Manufacturing, Institute for Manufacturing, University of Cambridge; managing a group of 25 researchers, lecturers and practitioners. The group operates in-depth collaborative projects with Industry to develop/identify manufacturing and supply chain capabilities and their associated network configuration models. Previous roles have been in Industry working for leading Multi-Nationals, as a Supply Chain Director of Multinational Regional business, Technical Director of a National Business, and other Senior Management positions, with 17 years industrial experience in a variety of front-line operational roles. Significant consultancy experience developed applying latest research into practice with leading organisations.

Professor Jim Lister, Purdue University

Jim Lister is a Professor of Chemical Engineering and Industrial and Physical Pharmacy at Purdue University and an internationally recognized leader in particle science and technology. His main research interests focus on particle design, the production of particles with well controlled size and morphology from sub-micron to millimeter scale. He is particularly well known for his work on granulation and is the author of a recently published text in the area, The Science and Engineering of Granulation Processes. Dr. Lister and Professor Ted White from the University of Queensland have established a major research focus on the recovery and delivery of bioactives for food and pharmaceutical applications.

Professor Sir Jim McDonald, Principle, University of Strathlycde

Professor Sir Jim McDonald is responsible for the day-to-day management of the University and is also responsible to the University Court for the finances of the University. He was appointed Principal in November 2008 and took up his post in March 2009. Professor McDonald leads specifically on Strategy and Planning; Research and Knowledge and Exchange and External Affairs and Development. He started his Strathclyde career as an undergraduate, before studying for an MSc and PhD in Power Engineering and Power System Economic. Sir Jim returned to the University in 1984 after eight years in industry and held several academic positions in the department of Electronic & Electrical Engineering including Head of Department, ultimately taking up the post of Rolls Royce Professor of Electrical Power Systems in 1994. He was promoted to Deputy Principal in August 2006 with a focus on research enhancement and business development. In October 2006 he was appointed Director of the Glasgow Research Partnership in He was awarded a knighthood in The Queen's Diamond Jubilee Birthday Honours for his services to education, engineering and the economy.

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Poster Presentations

1. 'Process Optimisation of L-Glutamic Acid in a Continuous Oscillatory Baffled Crystalliser'
   Naomi Briggs; EPSRC Centre, University of Strathclyde
2. 'Design Approach for Moving from Batch to Continuous: Oscillatory Baffled Reactor (OBR) Technology'
   Thomas McGlone, EPSRC Centre, University of Strathclyde
3. 'Feasibility studies on reactive crystallisation of calcium carbonate in a CoFlore'
   Vishal Raval, EPSRC Centre, University of Strathclyde
4. 'Discovery and Continuous crystallisation of a co-crystal in a Oscillatory Baffled Crystalliser (COBC)'
   Lihua Zhao, EPSRC Centre, University of Strathclyde
5. 'Update on Catalytic Hydrogen Transfer Reaction of Compound A In A Coflore ACR'
   Lihua Zhao, EPSRC Centre, University of Strathclyde
6. 'Physical Form Screening of Olanzapine, Amoxapine and Clozapine'
   Rajni Miglani, University of Strathclyde
7. 'Crystallisation of L-Glutamic acid polymorphs at constant temperature under different flow conditions'
   Ulrich Schacht, EPSRC Centre, University of Strathclyde
8. 'Modular test bench for continuous crystallisation'
   Anna Jawor-Baczynska, EPSRC Centre, University of Strathclyde
9. 'In-situ monitoring of crystallisation processes in MSMPR reactors using non-evasive Raman Spectrometry'
   Laura Palmer, EPSRC Centre, University of Strathclyde
10. 'Evaluation of a Continuous Reactor for the Crystallisation of L-Glutamic Acid'
    Denise Logue, EPSRC Centre, University of Strathclyde
11. 'Comparison of Two Continuous Reactors for the Cooling Crystallisation of L-Glutamic Acid, and a Particle Size Investigation'
    Denise Logue, EPSRC Centre, University of Strathclyde
12. 'Industrial Biotechnology Innovation Centre'
    Brian McNeil, University of Strathclyde
13. 'A Study of the Effect of Mixing Mechanisms in Cooling Crystallisation of Adipic Acid'
    Natalia Falenta, EPSRC Centre, Heriot-Watt University
14. 'The Institute for Process Research and Development'
    John Blacker, University of Leeds
15. 'Enablers and Barriers for Continuous Manufacturing in the Pharmaceutical Industry'
    Aylin Ates and Rajan Talati, EPSRC Centre, University of Strathclyde

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Poster Presentations

16. Configurable 3D-Printed millifluidic and microfluidic 'lab on a chip' reactionware devices'
Maria Vincenza Anna Dragone, EPSRC Centre, University of Glasgow

17. 'Flow-based methodologies for synthesis of complex chemical structures'
Andreu Ruiz, EPSRC Centre, University of Glasgow

18. 'Dynamic control of the synthesis of Au nanoparticles under flow conditions'
Victor Sans Sangorrin, EPSRC Centre, University of Glasgow

19. 'Understanding Polymorphism in Explosives: Crystallisation Studies on 2,4-Dinitroanisole'
Paul Coster, EPSRC Centre, University of Edinburgh

20. 'Co-crystallisation of Energetic Materials: HMX'
Craig Henderson, EPSRC Centre, University of Edinburgh

21. 'The effect of additives on gibbsite auto-precipitation and bauxite residue flocculation when processing goethitic bauxites'
Keddon Powell, EPSRC Centre, Loughborough University

22. 'Continuous Real Time Monitoring of Pharmaceutical Crystallization Processes Using Process Analytical Technology Array'
Ali Saleemi, EPSRC Centre, Loughborough University

23. 'Optimal Temperature Profile for the Reduction of Fines in a Continuous Plug Flow Crystallizer'
Aniruddha Majumder, Loughborough University

24. 'The influence of hydrodynamic environment on the nucleation mechanism of a chiral crystallization'
Craig Callahan, EPSRC Centre, Heriot-Watt University

25. 'On the effect of oscillation method on the nucleation mechanism of sodium chlorate in an oscillatory baffled crystallizer'
Craig Callahan, EPSRC Centre, Heriot-Watt University

26. 'An investigation into parameters affect purity of crystals in OBC and STC.'
Hannah McLachlan, EPSRC Centre, Heriot-Watt University

27. 'Structural Diversity in Layered Organic Materials through Templating Co-crystallisation'
Lynne Thomas, EPSRC Centre, University of Bath

28. 'Multi-component Crystallization in a Continuous Flow Environment'
Kate Wittering, EPSRC Centre, University of Bath

29. '3D Nanotemplates for Protein Crystallisation'
Umang Shah, Imperial College London

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Poster Presentations

30. 'Heat Exchanger Fouling Mitigation via Seeding'
Tomer Lapidot, Imperial College London

31. 'Continuous Crystallization of L-Glutamic Acid in Mesoscale Oscillatory Baffled Reactors'
Richard Abernethy, Newcastle University

32. 'Polymorphism and polymerisation of acrylic acid'
Iain Oswald, University of Strathclyde

33. 'Doctoral Training Centre in Continuous Manufacturing and Crystallisation'
Catriona Morrison on behalf of EPSRC Centre and Doctoral Training Centre

34. 'EPSRC Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation Industry Engagement'
Craig Johnston, CMAC and EPSRC Centre

Exhibitors

AMTechnology

Alconbury Weston Ltd (AWL)

NiTech

Cambridge Reactor Design

Continuous Manufacturing and Crystallisation (CMAC)/ EPSRC Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation

The Centre for Process Innovation (CPI)

The Technology Partnership (TTP)

GSE Systems Limited

Mettler Toledo

Process Systems Enterprise (PSE)

ULab – Equipment sharing and lab management on the internet

Technology and Innovation Centre (TIC)

Wyatt

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Delegate Listings

Richard Abernethy, University of Newcastle
Leila Alinaghian, EPSRC Centre, University of Cambridge
Dr Patrick Andrews, RKES, University of Strathclyde
Robert Ashe, AmTechnologies
Dr Aylin Ates, EPSRC Centre, University of Strathclyde
Dr Clive Badman OBE, CMAC Chair and GSK
Dr Richard Bailey,EPSRC
Alastair Barton, AWL
Prof Ian Baxendale, University of Durham
Prof John Blacker, University of Leeds
John Brady, Chemtura
Naomi Briggs, EPSRC Centre, University of Strathclyde
Dr Cameron Brown, EPSRC Centre, Heriot-Watt University
Craig Callahan, EPSRC Centre, Heriot-Watt University
Andrew Campbell, TTP
Paul Coster, EPSRC Centre, University of Edinburgh
Dr Adam Cumming,DSTL
Dr Sandy Dobbie, Chemical Sciences Scotland
Maria Vincenza Anna Dragone, EPSRC Centre, University of Glasgow
Caroline Edwards, Mettler Toledo
Dave Edwards, GSK
Paul Ewing, Fujifilm
Natalia Falenta, EPSRC Centre, Heriot-Watt University
Marianna Fazenda, University of Strathclyde
Sue Fleet, BRITEST
Prof Alastair Florence EPSRC Centre, University of Strathclyde
Neil Francis, Scottish Enterprise
Kenny Gilmour, Vitrex
Dr Kevin Girard, Pfizer
Joanna Gourlay, Scottish Development International
Dr Colin Groom, CCDC
Prof Gavin Halbert, EPSRC Centre, University of Strathclyde
Dr Ian Haley, Metler Toledo
Dr Malcolm Hannaby, TSB
Stuart Harrison, GSE
Dr Mark Hartshorne, Fujifilm
Prof Adam Harvey, Newcastle University
Craig Henderson, EPSRC Centre, University of Edinburgh
Prof Jerry Heng, Imperial College
Paul Hodges, NiTech
Steve Hulse, AWL
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Dr Blair Johnston University of Strathclyde
Craig Johnston, CMAC, EPSRC Centre
Prof Bill Jones, University of Cambridge
Zoe Kemp, Scottish Development International
Dr Alan Kennedy, University of Strathclyde
Anneke Klapwijk, EPSRC Centre University of Bath
Dr Markus Krumme, Novartis
Ian Laird, Begg
Tomer Lapidot, Imperial College
Dr Mei Lee, GSK
Dr Karen Lewis, GSK
Prof Jim Lister, Purdue University
Prof David Littlejohn, EPSRC Centre, University of Strathclyde
Denise Logue, EPSRC Centre, University of Strathclyde
Matthew Loryman, University of Strathclyde
Dr Aniruddha Majumder, Loughborough University
Craig Martin, Scottglass
Dr Thomas McGlone, EPSRC Centre, University of Strathclyde
Hannah McLachlan, EPSRC Centre, Heriot-Watt University
Dr David McLean, Syngenta
Prof Brian McNeil, University of Strathclyde
Ewan Mercer, Perceptive
Rajni Miglani, University of Strathclyde
Dr Haralampos Miras, University of Glasgow
Dr Catriona Morrison, EPSRC Centre, University of Strathclyde

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Delegate Listings

Neil Morton, AWL
Prof Alex Mullen, University of Strathclyde
Dr Hassan Muntaz, PSE
Prof Zoltan Nagy, EPSRC Centre, University of Loughborough
Prof Xiong-Wei Ni, EPSRC Centre, Heriot-Watt University
Dr Alison Nordon, EPSRC Centre, University of Strathclyde
Dr Iain Oswald, University of Strathclyde
Dr Ahn Phan, Newcastle University
Keddon Powell, University of Loughborough
Ornella Preisner, CPI
Dr Chris Price, GSK
Prof Colin Pulham, EPSRC Centre, University of Edinburgh
Vishal Raval, EPSRC Centre, University of Strathclyde
Prof Chris Rielly, EPSRC Centre, Loughborough University
Dr Rile Ristic, University of Sheffield
David Ritchie, Syngenta
Dr Amy Robertson, AstraZeneca
Andreu Ruiz, EPSRC Centre, University of Glasgow
Andy Rutter, GSK
Dr Ali Saleemi, EPSRC Centre, Loughborough University
Dr Victor Sans Sangorrin, EPSRC Centre, University of Glasgow
Ulrich Schacht, EPSRC Centre, University of Strathclyde
Dr Berthold Schenkel, Novartis
Dr Bernd Schmidt, GSK
Carol Scullion, Wyatt
Dr Jan Sefcik, EPSRC Centre University of Strathclyde
Umang Shah, Imperial College
Dr Kenneth Shankland, University of Reading
Rachel Sheridan, EPSRC Centre, University of Strathclyde
Dr Jon Paul Sherlock, AstraZeneca
Dr Pauline Sillers, Syngenta
Dr Gillian Smith, Cambridge reactor design
Dr Jag Srai, EPSRC Centre, University of Cambridge
Prof Gerry Steele, Visiting Professor University of Strathclyde
Dr Paul Stonestreet, Roche
Dr Kaska Sypek, Solid Form Solutions
Rajan Talati, EPSRC Centre, University of Strathclyde
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Trevor Todd, Bruker
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