

Faculty of Engineering
and Physical Sciences



UNIVERSITY OF LEEDS

Crystallisation Science and Engineering

Monday 25 – Wednesday 27 March 2024

100% OF 2023
RESPONDENTS
WOULD RECOMMEND
THE COURSE



Crystallisation Science and Engineering

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About the course

This three-day short course will outline the fundamental science and engineering of crystallisation processes. The programme embraces digital transformation and weaves together the best experimental and computational workflows. The course will include laboratory experimental sessions to demonstrate crystallisation processes, application of advanced process analytical technologies (PATs) and particle characterisation techniques. The delegates will also have first-hand opportunities to use crystallisation modelling software. The course will be delivered by leading academic and industrial experts in the field and will include case studies.

Course aims

Delegates will leave with core knowledge that they can use in their industrial work and a deeper understanding of crystallisation science and technology to assist in process development and scale-up of the manufacture of crystals for desired properties. The course will also give delegates the tools and a knowledge framework to be able to better support company project teams and engage experts when needed.

Who should attend

This course is aimed at engineers and scientists working in industries such as agrochemicals, biotechnology, food, fuels, personal care, pharmaceutical and speciality chemicals companies. It is relevant to those involved in crystallisation process development, scale-up, control and operations. It will also be of interest to post-graduates and post-docs involved in research in the general areas of solid form selection, particle design and crystallisation.

Course Directors

Dr Tariq Mahmud is an Associate Professor in Chemical Engineering. His expertise lies in industrial crystallisation process development, scale up and control. He also has extensive expertise in integrated CFD-process modelling encompassing development and validation of process models coupled with CFD of turbulent and multi-phase flow systems and nano-/micro-size particulate synthesis processes via crystallisation, reactive precipitation and spray drying. He has led a number of experimental and modelling projects in these areas, as Principal – or Co-investigator, funded by the UK EPSRC, Innovate UK and industry including AstraZeneca, GSK, Pfizer, P&G, NNL and Syngenta. Tariq is currently a committee member of the British Association for Crystal Growth (BACG) and a Council member of the European Network for Crystal Growth.



Dr Xiaojun Lai is a Lecturer in Chemical Engineering and has research interests in the application of process-related analytical and characterisation techniques to studies of crystallisation and precipitation processes. He has used reaction calorimetry for studying process thermodynamics, Raman technique for multiple component crystallisation system characterisation, and in situ XRD for phase transformation investigation. He has also recently developed instrumentation of laser interferometry for visualising crystal growth interface and mass transfer in the boundary layer, and combined X-ray topography and multiple diffraction to characterise crystal defects and made significant use of SR techniques, for in situ probing of crystal structure during practical processing and X-ray spectroscopy for probing impurity impact on crystal growth.



What our previous delegates say:

“The course covered all the key crystallisation topics. It was interactive, including a combination of presentations, laboratory demonstrations and a panel session for delegates to discuss their technical queries”

“The course provided excellent fundamental bases, very relevant case studies and valuable information about how the foreseeable future of the field from both academic and industrial scientists.”

Programme

Monday 25 March 2024

Crystallisation Fundamentals

- 08:45 Registration and coffee
- 09:10 Introduction
- 09:20 Crystallisation route map**
Professor Kevin Roberts, School of Chemical and Process Engineering, University of Leeds
- 10:20 Solution properties and supersaturation generation**
Dr Siti Fatimah Ibrahim, School of Chemical and Process Engineering, University of Leeds
- 11:05 Coffee
- 11:20 Nucleation and crystal growth**
Speaker to be confirmed
- 12:05 Fundamentals of polymorphism**
Speaker to be confirmed
- 12:50 Lunch
- 13:35 Laboratory Demonstrations**
- 13:40 Nucleation kinetics – Crystal16**
Sarah Thompson, Technobis, Netherlands and Dr Tariq Mahmud, School of Chemical and Process Engineering, University of Leeds
- 14:15 Growth kinetics**
Dr Xiaojun Lai, Dr CaiYun Ma and Chen Jiang, School of Chemical and Process Engineering, University of Leeds
- 14:45 Tea
- 15:00 Screening for polymorphs (solid form selection)**
Dr Bob Docherty, Visiting Professor University of Leeds. Previously Pfizer and ICI/Zeneca
- 15:45 Solid-state analysis for the characterisation of polymorphs and hydrates**
Dr Bob Docherty
- 16:30 Fundamentals of co-crystallisation and case studies of recent developments**
Professor Mingzhong Li, De Montfort University, Leicester
Professor Anant Paradkar, University of Bradford
- 17:15 End of day two
- 19:00 Course dinner – University House

Please note, although we remain devoted to the programme specified, we reserve the right to vary the programme in detail if required to do so by factors beyond our control.

Tuesday 26 March 2024

Crystallisation Process Engineering

- 08:45 Coffee
- 09:00 Hydrodynamics, mixing and heat transfer in batch crystallisers**
Dr Tariq Mahmud, School of Chemical and Process Engineering, University of Leeds
- 09:45 Workflow for crystallisation process development – a case study**
Dr John Hone, Syngenta
- 10:45 Coffee
- 11:00 Continuous crystallisation processes**
Christian Melches, GEA, Duisburg, Germany
- 11:45 Crystal morphology and habit modification**
Speaker to be confirmed
- 12:30 Lunch
- 13:10 Laboratory Demonstrations**
- 13:15 Particle characterisation Particle size measurement. Insitu particle imaging**
Dr Markus Honkanen, Pixact and Dr Tariq Mahmud
- Raman spectroscopy**
John Andrews, Clairet Scientific and Dr Xiaojun Lai
- 14:10 Laboratory Demonstrations continued**
- 15:00 Tea
- 15:15 Post crystallisation unit operations: filtration and drying**
Dr Alan Collier, Syngenta

Measurements and Control

- 16:00 Process spectroscopic techniques (IR, UV-vis, Raman)**
Dr Xiaojun Lai, School of Chemical and Process Engineering, University of Leeds
- 16:45 Control of crystallisation processes for PSD**
Dr Tariq Mahmud, School of Chemical and Process Engineering, University of Leeds

17:30 End of day two

Wednesday 27 March 2024

Measurements and Control continued

- 08:45 Coffee
- 09:00 Particle size and shape measurements and characterisation (including properties and performance)**
Dr Umair Zafar, Novo Nordisk, Denmark
- Crystallisation Modelling and Software Demonstrations**
- 10:00 Integrating computational and experimental crystallisation workflows to enable digital product design**
Dr Bob Docherty, Visiting Professor University of Leeds
- 10:45 Coffee
- 11:00 CFD modelling of crystallisation processes**
Dr Tariq Mahmud, School of Chemical and Process Engineering, University of Leeds
- 11:45 Digital design of crystallization processes**
Dr Niall Mitchell, Siemens Process Systems Enterprise (SPSE), London
- 12:30 Lunch
- 13:15 Panel Discussion and troubleshooting – experimental practices and best digital tools**
Chaired by Dr Bob Docherty, Visiting Professor University of Leeds
- 14:10 Software demonstration: VISUAL HABIT – enabling solid form and particle design**
Andy Maloney, Cambridge Crystallographic Data Centre
- 15:00 Tea
- 15:10 Software demonstration: Introduction to the crystallization modules of gPROMS Formulated Products (Simulation & Global System Analysis)**
Dr Niall Mitchell, SPSE
- 16:10 Wrap-up and feedback from delegates**
Dr Xiaojun Lai and Dr Tariq Mahmud
- 16:15 End of day three

View the full programme and book your place online at <http://eps.leeds.ac.uk/short-courses>

100% of 2023 respondents said the course met their expectations

Further information

Course Fees

The following course fees include the cost of tuition, course materials, lunches and light refreshments:

£1110 VAT exempt – Monday 25 – Wednesday 27 March 2024

Discount available to full time PhD students

Venue

The course venue will be within the Faculty of Engineering and Physical Sciences at the University of Leeds. The University campus is a 20 minute walk from Leeds city train station.

Please note, car parking for visitors is unavailable at the University. The nearest public car park is Woodhouse Lane at LS1 3HQ.

Accommodation

Delegates are responsible for their own accommodation (if required). A list of hotels close to the University will be sent out with the delegate joining instructions.

Course Dinner

The course dinner will be held on Campus on Monday evening and is included in the course fee. The dress code is smart casual.



How to Book

Please book your place for this course through our secure Online Store, using debit or credit card, following the instructions below:

1. Visit our Online Store at: <http://store.leeds.ac.uk>
2. Select Conferences and Events in the left-hand navigation bar and 'CPD Faculty of Engineering and Physical Sciences'
3. Select the relevant course, click on 'Book Event' and complete your booking details

You will receive an automatic confirmation email within 24 hours of your booking.

Get in touch


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Terms and conditions for booking

Payment

Payment by debit/credit card should be made at the time of booking via the Online Store. If for exceptional reasons you are unable to book and pay online a purchase order document will be required to support a manual booking process. Our standard payment terms are 30 days from date of invoice however payment must be made prior to attendance. Attendance may be refused if payment has not been received.

Changes made by the University of Leeds

The course programme may have to be re-scheduled or the speakers changed for reasons outside our control. The University of Leeds reserves the right to cancel or postpone a course, in which case fees will be refunded in full. In the event of cancellation, the University will not be held liable for delegates' travel or accommodation expenses.

Where a delegate cancels a registration

For cancellations made within seven days of booking: a full refund is payable unless the course starts within the next seven days, in which case the full fee is payable and no refunds will be made.

For cancellations made after seven days of booking: written cancellations received up to 15 working days before the course will be subject to an administrative charge of 20% of the total fee. Within 15 working days of the course the full fee is payable and no refunds will be made.

For non-attendance: the full fee is payable and no refunds will be made. Appropriate course materials will be sent to the registered delegate.

In the event of cancellation, the University will not be held liable for or refund any incurred travel or accommodation expenses. Substitutions may be made at any time.

Data/Privacy

Your right to privacy is important to us. We will only use your information to provide information on our CPD courses and relevant events. We will not pass your details on to any other organisations. The ways in which your personal data may be used when you provide it to us are defined in our Privacy Notice at <https://eps.leeds.ac.uk/privacy>.

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