HIGHLIGHTS

A1. Advanced Powder Rheometry

A2. Modern MIlling Techniques for Powder Particle Size Reduction

16.09.2025

Attend the International Particle Technology Forum September 30, Teddington (London). Organised by the RSC-PCIG & IChemE

Attending Forge 2024: A Journey of Inspiration and Opportunity

Newsletter 8 (PCIG N8)

Welcome to the eighth edition of our newsletter!

Join Us in Advancing Scientific Research

RSC INTEREST GROUP
PARTICLE
CHARACTERISATION

Newsletter 8 (PCIG N8) - 16.09.2025

PREFACE

This newsletter aims to serve as a means of internal communication of useful information and strengthen the engagement among the group members. This quarter's newsletter with the eighth edition (May 2025 – September 2025), consists of three main sections:

A. Research highlights, which represent the emerging technologies in particle characterisation.

B. People focus, which reveals the motivation and sharing from different researcher members.

C. Update corner, which summarises new events, collaboration, and other opportunities.

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We would like to express great appreciation to the PCIG Committee for encouraging and advising us to issue the first edition of PCIG Newsletter. Many thanks for the contribution from the people who are willing to co-operate with us. We look forward to your collaboration in the next editions!

Welcome to the PCIG Newsletter,
where we network and work together for better particle technologies.

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A. RESEARCH HIGHLIGHTS

A1. Advanced Powder Rheometry

Written by Phil Jackson

Figure 1: Dynamics of Powder Flow

Powder flow has traditionally been measured using relatively primitive tests. One example is Angle of Repose, a test in which a fixed mass of powder is allowed to flow through a fixed diameter orifice to create a cone of powder on a plate below. The resulting angle from the horizontal in the cone is a measure of flow, with larger angles indicating poor flow. Other tests include the maximum diameter orifice allowing flow and the time taken for powder to flow through a fixed diameter orifice. All these tests relate to powder flow when there is a significant level of air between moving powder particles. Aspects on how powders behave as they are encouraged to pack closer together under vibration are covered by measurements such as the Carr Index and Hausner Ratio.

Whilst these tests have proved reliable as QC tests in production, there are many instances where workers report that two powders with similar flow behaviour perform very differently when processed.

Converting dry powder raw materials to final shaped products involves a series of process steps in which the powder is undergoing complex movement. We can divide the processes loosely into two categories:

1) Processes where the powder particles are surrounded by significant amounts of air

2) Processes where particles are more tightly packed together

For 1) we can think about powders flowing out of hoppers under gravity, being conveyed pneumatically along feed pipe or being fed into a die prior to compaction.

For 2) we have process steps where we want powder particles to come closer together (e.g. uniaxial pressing of pharmaceutical tablets or isostatic pressing (cold or hot) of ceramic components. Equally though, there are points in powder processing where unwanted compaction leads to problems. For example, in silos powders can adhere to inner walls to prevent mass flow. Or the weight of powder above the silo exit can compact powder near the exit, leading to bridging and no powder flow.

It is unsurprising, therefore, that properties such as particle size, particle shape, specific gravity etc. often fail to differentiate “good” and “bad” powder batches. Equally, simple tests dedicated to powder flow (Angle of Repose, minimum orifice diameter allowing powder flow, time of powder flow through a fixed diameter orifice etc.) often prove inadequate.

More recent developments in powder rheometry have led to analytical offerings that have different testing modes according to the processing step the user needs to focus on. The Freeman FT4 rheometer is an example of a rotational rheometry approach that adds an extra degree of sophistication to powder flow testing, especially for scenarios where plenty of air exits between particles. Specifically, the FT4 uses the principles of rotational rheometry. For example, the Freeman FT4 rheometer has three generic modes called Bulk Preparation, Shear and Dynamic Flow. The first two relate to tests where the sample powder particles are forced close to each as defined in category 2 above. The tests involve applying increasing load from above to compact powder in a constrained space. At each applied load, a variety of tests can be performed, for example percentage (%) reduction in volume, permeability (how easy it is to force air through the developing compact) or shear strength (how easy is it to disrupt the compact by rotating an upper plate through it).

During the descent there is a resistance to both (i) the downward movement of the paddle, which increasingly compacts powder below it, and (ii) the rotational pavement of the paddle stirrer. These two resistances can be measured and combined as a total energy (mJ) experienced. By monitoring total energy as a function of distance travelled (mm), we arrive at an energy gradient. By plotting energy gradients against distance travelled, we generate a graph where the area under the graph is Total Flow Energy (TFE). The final graphs displayed often show TFE as a function of test number (repeating the test on the same sample can establish whether there is a tendency for samples to separate based on different component specific gravities or a wide size range in a single component powder). Alternatively, a series of tests can be run with the introduction of increasing compressed air between or during runs (this again can induce phase separation associated with fluidization) or the use of decreasing paddle speed.

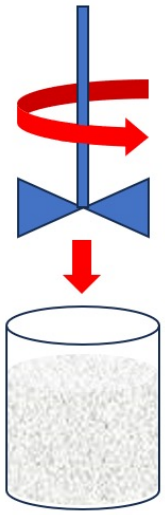

Figure 2: Principle of Dynamic Flow Powder Testing with the FT4 rheometer

The FT4 also allows users to evaluate how powders behave when compressed. This provides useful data on the tendency for powders to clump together in silos or IBUs (unwanted behaviour) as well as how well powders combine to form tablets (desirable behaviour). The % volume change versus load applied to a powder bed from above gives useful information on how easily particles can move past each other and how well they subsequently pack. Such data will likely show strong correlations to powder variables such as shape, particle size distribution and individual particle compressibility. Permeability (achieved by measuring the resistance to air flow experienced through the compact generated as a function of load) is a further useful measurement. Finally, the strength of compacts formed versus load applied can be evaluated by measuring the force experienced when rotating an

As a company that exists to support clients in better understanding and controlling their processes, embracing new powder characterisation techniques is essential. Although we are still learning to use the FT4, Lucideon / AMRICC have carried out a number of case studies, two of which are offered here:

1. Case study - Cellulose powder grades

The first case study relates to testing cellulose powder grades to be used as a binder in a multi-component toilet block product. Since powder blending and transport featuring high air levels is used in processing, the client was interested in evaluating dynamic flow behaviour. By considering the cellulose powder alone, the hope was to quickly identify a preferred grade prior to detailed mixed powder testing. Figure 3 shows how three CMC grades behaved in a test where Total Energy was evaluated against increased aeration air velocity. Two grades (the lower molecular weight grades (90 K and 250 K) showed a pleasing drop in energy associated with air helping to reduce particle-particle interactions. This suggests some cohesivity (which will be useful during the later pressing operation) but good flow. In contrast, the 700 K grade shows a high total energy (resistance to powder movement) that persists even with aeration. Interesting correlations with other tests were seen: the Span (particle size distribution, PSD) for 700 K was low. Such a narrow distribution should improve flow and, indeed, the AoR test supported this. However, the narrow PSD clearly afforded less opportunity for air to separate connected powder particles. The profile in Figure 3 might also be suggestive of a fluffy powder that is reluctant to deagglomerate in air. AoR failed to differentiate the 90 K and 250 K grade, whilst the FT4 data (including permeability and % volume compression testing) supported use of the 90 K grade.

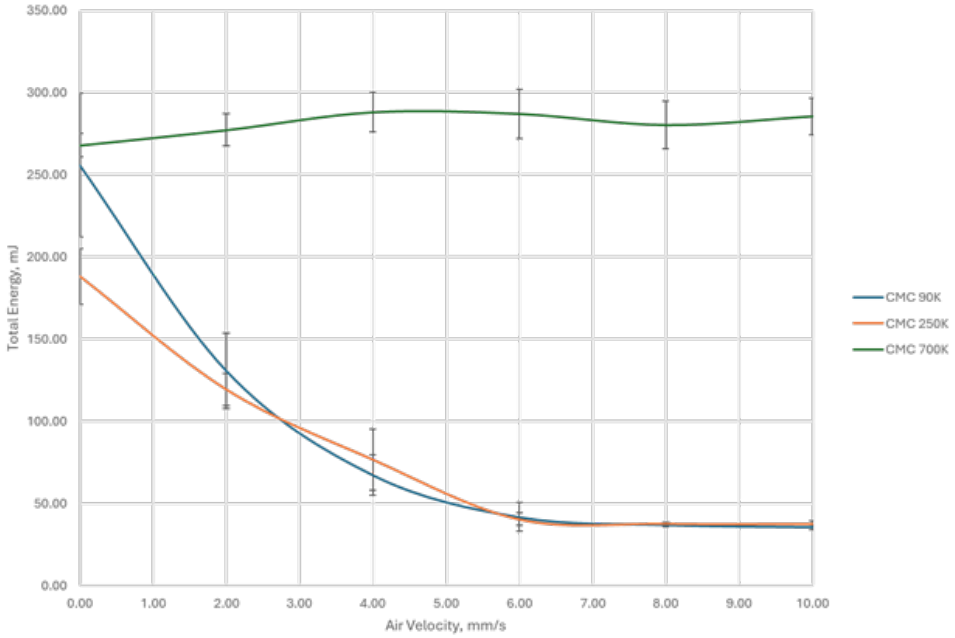

Figure 3: Dynamic Flow aeration testing of 3 cellulose grades.

2. Case study - Oxide powders processing

The second case study concerned selection of oxide powders for pre-blending and sintering to develop a mixed oxide crystalline phase. Such processing can be important in production of ceramic colours, for example. Figure 4 shows contrasting behaviour between one oxide in its “as-received” and “heat treated” form. The x-axis in Figure 4 relates to test number. The first 8 experiments were repeated dynamic flow tests. The last 4 experiments relate to the same test conducted at decreasing paddle rotation rates. It can be seen that the “as-received” sample experiences a slight rise in total energy during the first 8 repeat experiments. This can be due to the paddle causing some agglomerate breakdown and better packing of the resulting particles. An oxide, prior to heat treatment, may well feature more loosely bound water that encourages cohesion. For the last four experiments, the “as-received” sample experienced a greater resistance to paddle movement as paddle speed is reduced. Clearly, the slower paddle speed struggles to move the powder. Overall, it was ultimately shown that heat-treated powders were seen to offer better dry powder behaviour either alone or in mixed systems.

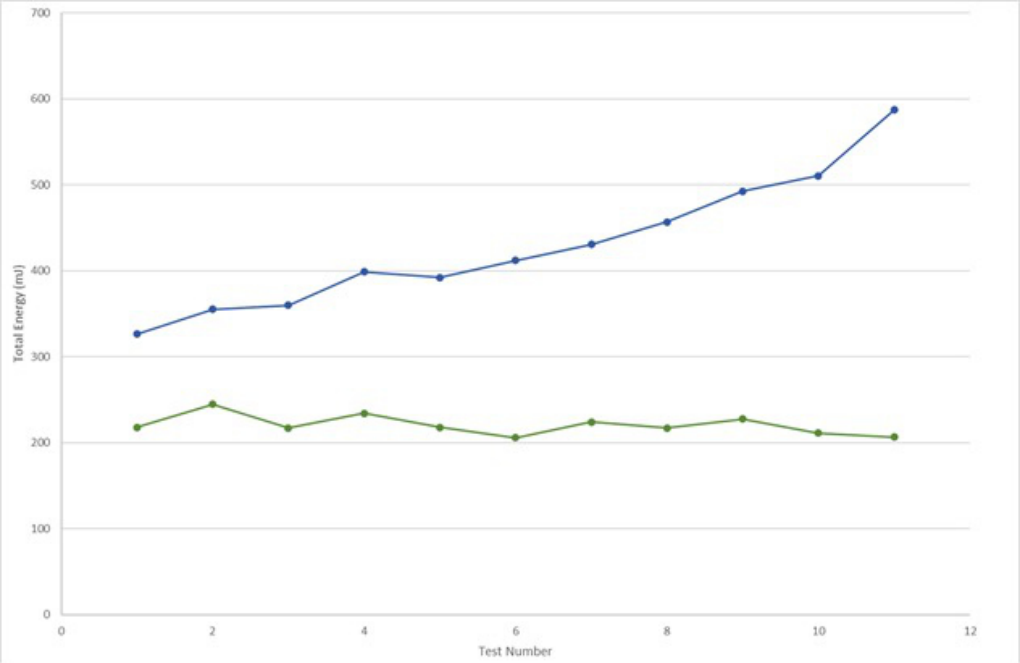

Figure 4: Dynamic Flow test for two versions of the same oxide powder (blue = as-received; green = heat-treated)

Such is the versatility of the FT4 rheometer, Lucideon believes that it can take companies years to fully appreciate which test(s) is (are) appropriate for a given processing challenge. It is important to stress that correlations need to be made between FT4 data trends and (i) other analytical tests for raw materials (particle size, particle shape etc.) and (ii) end product properties (e.g. a tablet pressed with a powder). Design of Experiment (DoE) is a vital tool in understanding how powder flow can be controlled through raw material property optimisation, leading to high end product yields and desired end product properties. DoE can also be useful in using initial intensive FT4 analysis to transition to confidence in using simpler QC tests (like AoR) in production.

A2. Modern Milling Techniques for Powder Particle Size Reduction

Written by Anna Anandita

Particles, ranging from nanometres to millimetres, play vital roles in various industries such as construction, manufacturing, pharmaceuticals, food, and refrigeration [1]. Optimising particle size is crucial for smooth handling, uniform blending, and preventing particle segregation. In pharmaceuticals and catalysis, smaller particles improve dissolution rates and reaction kinetics, ensuring consistent bioavailability and uniform absorption. Particle size reduction, or comminution, the surface area of particles, improving their properties. This article discusses key milling methods, their operational principles, advantages, scalability, and influence on material characteristics.

Primary Milling Techniques

1. Ball Milling: Uses rotating cylindrical drums with grinding media to grind particles through impact and attrition. It is versatile, scalable, and efficient, but requires temperature control and has a risk of contamination [2,3].

2. Jet Milling: Employs high-velocity streams of compressed air or gas to induce particle collisions, suitable for delicate or high-purity applications. It operates without mechanical contact, preserving heat-sensitive materials, but has high energy consumption and operational costs [3,4].

3. High Shear Homogenisation: Utilizes intense mechanical and hydraulic shear forces to break down particles in liquid media. It is efficient, scalable, and suitable for pharmaceuticals and food industries but limited to wet systems [4,5].

4. Wet Milling: Involves dispersion of raw materials in a liquid medium and particle size reduction through mechanical agitation. It is effective for heat-sensitive materials but requires subsequent drying [5].

Other Modern Milling Techniques

1. Disc Mills: Operate by allowing materials to pass through rotating discs, generating friction and grinding. They are efficient for fibrous materials but have small operating volumes and high energy input. [3,6]

2. Attritors (Stirred Ball Mills): Use a rotating impeller in a reactor filled with grinding media to produce fine-sized particles. They are effective but have challenges with product-media separation and high wear of grinding media [3,4].

3. Planetary Mills: Advanced ball mills with dual rotation, enabling high-energy mechanical action. They are suitable for fine grinding but require significant energy input [3,4].

4. Vibration and Vibrocentrifugal Mills: Used for fine grinding, operating with vertical vibrations or centrifugal force. They offer high energy density but require special foundations and can lead to a temperature rise [3,4].

5. Roller and Centrifugal Roller Mills: Apply simultaneous abrasion and crushing forces. They have high production capacity but can produce a broader size distribution [3,4].

6. Extruders: Use screws to capture and press materials, inducing plastic deformation and friction. They are effective for high moisture content materials, but have high mechanical loads on screws [2-4].

7. Hammer Mills, Knife Mills, Pin Mills, and Disintegrators (Free-Impact Mills): Use rotating discs with grinding elements to create an impact. They have high production capacity but high wear of grinding parts [3,4].

The different milling techniques are summarised in the following table.

Table 1: Different milling techniques used particle size reduction

Technique	Particle Size Achievable	Major Advantages	Scalability	Key Limitations	Material Impact
Ball Milling	Fine to ultra-fine	Versatile, uniform output, low cost	High	Potential contamination & heat	Consistent particle size, structure changes possible
Jet Milling	Micron to sub-micron	High purity, no contamination, tight PSD	High	High energy & complexity	Ultra-fine, stable particles, sensitive material safe
High-Shear Homogenisation	Sub-micron (liquids only)	Efficient, uniform dispersions, scalable	High	Limited to wet/emulsion systems	Stable emulsions/ suspensions, enhanced bioavailability
Wet Milling	Sub-micron/ nanometer	Effective for heat-sensitive, industrial	High	Requires drying, medium compatibility	Consistent nanomaterials, minimizes agglomeration
Disc Mills	Micron range (e.g., 20−300 µm)	Narrow particle size distribution	Low to Medium (up to 500 kg/h)	Small operating volume, temperature jump in pretreatment zone	Potential decomposition of heat-sensitive substances
Attritors (Stirred Ball Mills)	Nanometer range	Particles remain in contact zone, achieves nanosized particles	Limited for dry grinding, better for wet	Difficult to isolate product from media, high wear of grinding media, product contamination	Product contamination
Planetary Mills	Nano to ultra-fine	High intensity mechanical action, high energy density for complex processes	Limited for continuous flow, good for batch lab scale	Significant temperature elevation (hundreds of degrees), difficult uniform feeding/removal for continuous flow	Decomposition of low-molecular- weight substances, polymer carbonization, undesirable processes
Vibration and Vibrocentrifugal Mills	Ultra-fine to nano	High energy density, can achieve very small particles, increased grinding volume	Limited (requires special foundation for vibration mills)	Requires special foundation, temperature elevation, low-density feedstock can reduce collision probability	Oxidation, decomposition, de-polymerization of heat-sensitive materials
Roller and Centrifugal Roller Mills	Fine to micron	High production capacity, good scalability (roller mills), narrow PSD (centrifugal)	High (up to 1000 tons/h for roller mills)	Difficult to control temperature (roller mills), broad PSD (roller mills)	Overheating of plant raw material
Extruders	Structural modification (not primarily for fine particle size reduction)	Can grind high water content materials, large particle size feedstock, enables mass transfer for reactions	Limited (challenging above 100 kg/h)	High mechanical load on screws, high temperature generation, steam explosion conditions	Strong plastic deformation, high temperature, potential degradation of thermolabile substances
Hammer Mills, Knife Mills, Pin Mills, and Disintegrators (Free-Impact Mills)	Coarse to fine (rarely below 75 µm)	High production capacity, low specific energy expenditure	High	Production capacity drops with finer mesh, expensive fine screens, high wear of grinding parts	Internal structure of fibrous materials often retained

Modern Combination Methods

1. NanoEdge: Combines high-pressure homogenisation with precipitation to reduce particle size and stabilize them.

2. Cavi-precipitation: Combines precipitation with microfluidisation to form fine particles.

3. Freeze-dry HPH: Freeze-dries a mixture to synthesize porous particles, bypassing solvent removal.

4. Layer-by-layer Sonication: Uses ultrasonic size reduction with polyelectrolyte coating for particle stabilization.

5. Ultra Cryo Milling: Uses cryogenic liquids for wet ball/bead milling to avoid aggregation.

A comparative schematic of the capacity and final particle size distribution for the described milling techniques is shown in Figure 1.

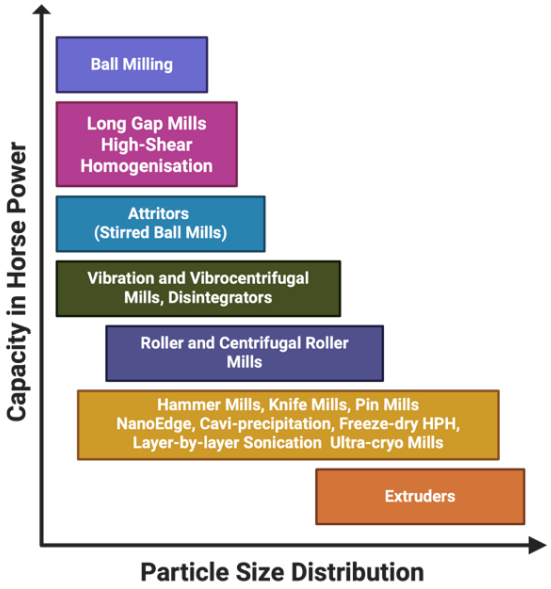

Figure 1: Comparison of capacity and final particle size distribution for various milling techniques.

Various techniques are employed to ensure particle size distribution and properties, including laser diffraction, dynamic light scattering, optical microscopy, scanning electron microscopy, transmission electron microscopy, X-ray Photoelectron Spectroscopy, and X-ray Diffraction. The selection of the milling technique requires a well-defined understanding of the material nature, application requirements, scale, and desired powder attributes for efficient particle size reduction. Each technique offers its unique strengths and must be complemented with corresponding material and process needs. An extensive characterisation is indispensable for optimising manufacturing efficiency and end-product functionality, performance and safety. Advances in precision milling and analysis continue to underpin innovation in pharmaceuticals, advanced materials, food production, and many other domains.

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B. PEOPLE FOCUS

WHY JOIN US?

- We love to understand your technical and social experiences, especially your untold stories throughout the learning and working journey.
- We would like to motivate more students - researchers to follow their passion and careers in particle science.
- We believe a single effort and contribution to help make our world better should be recognised and spread out.

HOW?

If you are interested in participating, please contact us for more details!

B.1 Get to know

Collected by Tien Thuy Quach

We can learn from the research interest and career pathways from our PCIG members. We will start with an overview of two of the Committee members, but please contact us to share your background and experience in future newsletters.

Viktoriya Ivasiv, MSc

I hold a master's degree in Pharmaceutical Sciences from University of Coimbra and possess a strong interest in drug discovery and healthcare. Currently, I am pursuing a Ph.D. in Applied Chemistry, where my focus lies in developing nanoparticles for cancer treatment. My doctoral research provides me with the opportunity to explore various techniques for characterising nanoparticles. I became involved with the Particle Characterisation Interest Group due to my passion for particle characterisation and my desire to engage with a community dedicated to this subject. I enthusiastically joined the committee, believing that I can make meaningful contributions to the field and offer assistance to others facing similar challenges.

Okba Al Rahal BSc, MSc, PhD, MRSC

I am an early-career researcher at the University of Birmingham with research interests spanning across a wide range of topics in chemistry, pharmacy, materials science and formulation science.

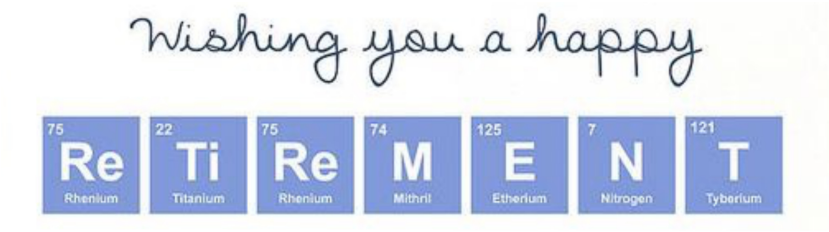
I obtained a pharmacy degree from Damascus university / Syria and was within the top 10 graduates. Following my pharmacy degree, while working as a formulation scientist at PharmaQuest International Centre, I obtained my first master's degree in pharmaceutical science from Damascus university.

After moving to the UK, I obtained a second MSc by research in formulation design and analysis degree from the University of Reading with distinction. In 2019, I finished my PhD studies at Cardiff University researching various aspects of solid-state chemistry including crystallography, crystallisation, pharmaceutical cocrystals, polymorphism and structure solution from PXRD data. After my PhD, I worked at materials science department in GSK where I used various techniques for particle size, solid-state, thermal, structural and hygroscopic characterisation of active pharmaceutical ingredients and their final products. Currently, I am a research fellow in experimental solid-state chemistry and mechanochemistry at the University of Birmingham.

I have recently become a member of the RSC and joined the PCIG as a committee member. I believe this is a great opportunity to establish various skills and build up a network with other researchers from both academia and industry.

B2. Our inspirer: Phil Jackson

Thank you for your contributions to our PCIG newsletter, Phil Jackson!



You have been involved from the very start of our PCIG newsletter back in 2023 where you have been a driving force in sharing your expertise and knowledge. Even before the previous newsletter was published, you already had many new ideas for the next edition. Your dedication to the community and contributions will be missed.

We wish you all the best in your next chapter of your life and thank you for everything you've done for the PCIG over the years!

The PCIG Committee

Inspiring stories

Do not hesitate to share your stories to motivate other researchers and students. You can write about the people, the events that motivated you throughout your learning, working and research (either the good or the bad things happened). We look forward to hearing from you.

Story 1: My Experience at the FORGE Conference 2024 at the University of Leeds

Written by Bisola Beckley - MSc Student in Pharmaceutical Sciences 2023-2024, Aston University, UK – Contact: beckleybisola@gmail.com;

I had the pleasure of attending the FORGE Conference 2024, which took place on the 12th and 13th of November at the University of Leeds. The event focused on particle engineering and characterisation, bringing together researchers, professionals, and industry leaders from the world of pharmaceutical sciences. It was an amazing opportunity to meet others with a passion for advancing drug development and delivery.

One of the highlights of the conference was the chance to present my research. My talk focused on enhancing the drug loading of Siponimod mini tablets, a promising treatment for multiple sclerosis. Siponimod is already making a real difference for patients, but improving the formulation could make it even more effective and accessible. I explored methods to optimise the drug-loading process to boost its therapeutic potential. Presenting at such a respected event was both exciting and slightly nerve-wracking. Sharing my findings with an audience of experts, answering their questions, and hearing their feedback gave me a lot to think about. It was an incredibly valuable experience that left me feeling encouraged and inspired to keep improving my work.

I was also given the honour of presenting research on behalf of my colleague, Sahil. His work focused on formulating and optimising hydrocortisone mini tablets using direct compression, with a special emphasis on making them vegan- and vegetarian-friendly. This approach is both innovative and important, addressing the need for inclusivity in pharmaceutical development—a factor that is often overlooked.

The conference wasn't just about presenting. I had the chance to attend several talks from other academics, industrial staff, and research students. For example, one presentation from Malvern Pharmaceuticals highlighted advancements in particle size analysis and its implications for drug delivery. I learned about the latest methods and tools that are transforming pharmaceutical development, and these insights will undoubtedly influence my future research approaches.

Photo 1.1. My poster presentation at University of Leeds, UK

Photo 1.2. Several audiences focused and asked questions to understand my research

Networking with other participants was a crucial part of the conference. Over coffee breaks and lunch sessions, I connected with fellow researchers and industry professionals who shared invaluable advice about pursuing a PhD and applying for scholarships. These conversations helped me identify potential collaborators and resources for future projects. One particularly inspiring discussion was with a senior researcher from PerkinElmer, who offered tips on tailoring applications to align with funding priorities for PhD programs.

For anyone planning to apply for the Development Grant at Aston as a Master's student, here are some tips based on my experience: clearly articulate how your research aligns with the grant's objectives and contributes to your academic or professional goals. Provide concrete examples of how the funding will enable you to achieve specific milestones, such as attending conferences like FORGE. Share your application draft with mentors or colleagues for constructive feedback. Finally, use events like FORGE to build connections that strengthen your application, such as securing letters of support from established researchers.

The atmosphere throughout the conference was buzzing with energy and curiosity. It was inspiring to be surrounded by people so dedicated to making advancements in the field. Whether it was during formal sessions or casual conversations over coffee, the sense of collaboration and shared purpose was impossible to miss. The University of Leeds provided an ideal backdrop for the event. With its blend of historic charm and modern facilities, it created a welcoming space where ideas could flow freely. The organisers did a fantastic job of keeping everything running smoothly, from the packed schedule to the networking opportunities. Looking back, I'm incredibly grateful for the chance to present my research, share Sahil's important work, and learn from so many brilliant minds in the field. The FORGE Conference 2024 wasn't just an event. It was a chance to grow as a researcher, make meaningful connections, and gain new insights into the latest innovations in pharmaceutical sciences.

I'm already looking forward to next year's conference and can't wait to see how the ideas and collaborations sparked this time will develop. If you ever get the chance to attend, I couldn't recommend it more. It's an experience that leaves you inspired and full of fresh perspectives.

Photo 1.3. Final group photo included a range of organisers, sponsors and participants

Story 2: Attending Forge 2024: A Journey of Inspiration and Opportunity

Written by Sophia Torgal - MSc Student in Pharmaceutical Sciences 2023-2024, Aston University, UK – Contact: sophiatorgal@gmail.com

On November 12th and 13th, 2024, I had the incredible privilege of attending the third FORGE Conference at Cloth Hall, University of Leeds, Leeds UK. Unlike traditional conferences on particle sciences, FORGE can bring a unique and refreshing perspective to the scientific community. This event is designed to inspire, with plenary lectures delivered by world-renowned experts who not only share cutting-edge technologies but also weave in the passions and motivations that drive their research work. This year, the conference focused on fostering engagement among research students, university technicians, formulational and analytical manufacturers, and early and mid-career scientists, encouraging them to present their research and interact with leading experts in the field.

Photo 2.1. My poster presentation at Cloth Hall, Leeds UK

Photo 2.2. At FORGE 2024 with my colleague- Bisola Beckley

Thanks to the unwavering support and guidance of my supervisor, Dr. Tien Thuy Quach from Aston University, I had the honor of participating in FORGE Conference 2024. Her mentorship has been instrumental in shaping my academic journey and in helping me seize opportunities for professional growth. At the conference, I presented a three-minute oral presentation from my MSc project- "Stereolithography-Derived Extended-Release Tablets for the Treatment of Parkinson's Disease". It was an unforgettable experience that culminated in being awarded the Best MSc Presentation—an achievement that filled me with immense pride and gratitude. A highlight of the conference was the newly introduced session on industrial instrumentation, led by experienced professionals. This session provided an invaluable opportunity to not only present our main and collaborative works, but also engage in discussions with global leaders, and gain insights into advanced characterisation techniques. For example, I had the chance to share the recent updates from the work with one of my colleagues, Gaurav Kumar Singh, in the project "Innovative Fabrication of Rifaximin Tablets Using Stereolithography 3D Printing". This collaboration allowed me to delve deeper into the innovative techniques shaping the future of pharmaceutical development.

FORGE 2024 also offered a platform to collaborate and learn from others in the field. Particularly, I had a chance to interact with academics, industrial staff and PhD students from different backgrounds and shared knowledge and networking with other participants on planning my future goals regarding higher studies and job search. FORGE 2024 was more than just a conference; it was a transformative experience that boosted my confidence and expanded my horizons. Engaging with researchers and witnessing their groundbreaking work was both humbling and motivating. It reminded me of the importance of staying curious, passionate, and dedicated to my research endeavors. The breadth and depth of knowledge shared during the event were truly inspiring.

I am deeply grateful to the Royal Society of Chemistry – Particle Characterisation Interest Group for organizing such an extraordinary event that brings together scientists from diverse backgrounds. I would also like to extend my heartfelt thanks to Aston University and Dr. Tien for their unwavering support, including providing the Development Grant that made this journey possible.

Attending Forge 2024 has left me with a renewed sense of purpose and enthusiasm for my work. It underscored the value of collaboration, innovation, and the sharing of knowledge—principles that are essential for driving scientific progress. I look forward to applying what I've learned and continuing to contribute to this dynamic field.

Photo 2.3. I was happy to receive "Best MSc Presentation Award"

Photo 2.4. I celebrated this great achievement with my supervisor Dr. Tien Thuy Quach

C. UPDATE CORNER

C1. a) Cambridge Particle Meeting 2025: A Hub for Aerosol Innovation and Collaboration

Written by Mel Disher

Now in its 28th year, the Cambridge Particle Meeting continues to be a cornerstone event for researchers working with aerosolised particles across disciplines. Held on 1st July 2025, this year's meeting brought together a vibrant community of scientists, engineers, and industry professionals to explore the latest in particle characterisation, measurement, and health impacts.

Hosted in the historic city of Cambridge, the event offered a full day of talks, poster sessions, and networking opportunities—all free to attend thanks to the generous sponsorship of Cambustion. The meeting's accessibility and interdisciplinary scope make it a must-attend for anyone working with aerosolised particles, from atmospheric science to combustion diagnostics and bioaerosol research.

Highlights from the 2025 Programme

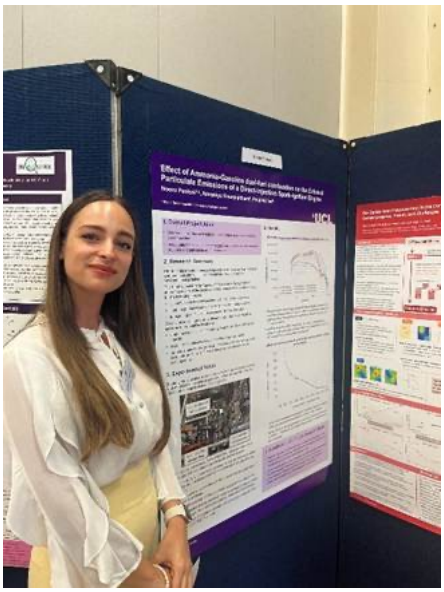
The day opened with a compelling keynote by Marc Stettler (Imperial College London), who challenged attendees to "look up" and consider the climate mitigation potential of aircraft-emitted particles. Talks throughout the day spanned topics such as:

- **Sustainable aviation fuels and contrail formation** (Jack Macklin, University of Leeds)
- **Biofuel blending and pulmonary toxicity** (Emma Hailwood, UCL/UKHSA)
- **Tyre nanoparticles and extender oils** (Siriel Saladin, University of Cambridge)
- **New instrumentation for aerosol measurement** (Chris Nickolaus, Cambustion Ltd)

Posters: A Showcase of Emerging Talent and Diverse Applications

The poster sessions this year were particularly vibrant, featuring a broad mix of academic and industrial research spanning combustion science, emissions testing, indoor air quality, and medical aerosols.

Among the poster contributors was Noemi Paoloni from University College London, attending her first Cambridge Particle Meeting. Her poster explored the effect of Ammonia-Gasoline dual-fuel combustion on exhaust particulate emissions in a direct-injection spark-ignition engine. It was a compelling contribution that sparked thoughtful discussion on alternative fuels and emissions mitigation—underscoring the event's role in fostering early-career researchers.



Other posters included:

- **Development of a bioaerosol test facility** – David Tupman, Kromek
- **Spatio-temporal dispersion near rail-cargo corridors** – Jacob T. Varghese, Saintgits College of Engineering
- **Soot measurement in SAF combustion** – Zihan Feng, University of Leicester
- **Contrail replication techniques** – Katharina Tegethoff, University of Cambridge

and many more, reflecting the interdisciplinary depth of the field.

A Platform for Publication: Aerosol Research

This year's meeting also featured a call for papers for the journal Aerosol Research, a diamond open-access publication supported by Copernicus Publications. The journal welcomes high-quality research and review articles across all areas of aerosol science, including:

- Aerosol technology and instrumentation
- Atmospheric aerosols and climate interactions
- Health impacts of particulate matter
- Fundamental aerosol processes

For those interested in submitting, detailed author guidelines and manuscript templates are available on the Aerosol Research submission page. Manuscripts are submitted via the Copernicus Office Editor system following registration. For specific queries, authors can reach out via the contact form provided on the journal's official website.

C1. b) CINBIO 8th Annual Meeting 2025: a platform for updates on recent advances and networking in nanotechnology and biomedicine

Written by Stefanos Mourdikoudis

CINBIO (Center of Research in Nanomaterials and Biomedicine) is a multidisciplinary research centre of the University of Vigo, located in Galicia, northwestern Spain. CINBIO has more than 200 members of staff, i.e. professors, lecturers, post-doctoral researchers, PhD candidates and lab technicians, with a remarkable international character. Every year, researchers from this institute gather to demonstrate their progress in chemistry, nanotechnology, biology, medicine along with health, physics, mathematics and information technology, core research lines at CINBIO, reflecting its multidisciplinary vision. Recent results on the synthesis, characterization and biological/biomedical applications are annually presented by prominent scientists from several countries who are invited to participate in the event and present their findings.

The 8th annual meeting took place on July 10-11 in the Museum 'Marco' at the center of Vigo, being organized by CINBIO's postdocs, and it was free to attend – no registration fee was applied, thanks to the valuable sponsorship provided by the University of Vigo, CINBIO, Iesmat and Deputacion-Pontevedra. Various interesting keynote, invited, oral and poster presentations attracted the attention of the audience, which consisted of approximately 200 participants. A novelty in this year's schedule was the organization of a roundtable discussion, where four researchers described and exchanged views on their trajectory from junior to mid-career and more senior research positions.

More info at: https://cinbio.es/8am

Clement Sanchez presenting his keynote talk

Highlights from the 2025 Meeting

The first day of the meeting started with an attractive keynote talk presented by Annemiek van Spriel (Radboud University, Netherlands) entitled 'Tetraspanins: Molecular Organisers of the Immune Cell Surface. Further talks during the first meeting day covered topics such as:

- Decoding the structure of donor polymers for organic solar cells (Jaime Martin Perez, University of Coruña, Spain)

- Optimization of inhalable nanomedicines through the use of magnetic nanoparticles (Susana Carregal, CIC Biomagune, San Sebastian, Spain)

- Smart material-based sensors for selective and real-time chemical detection (Veronica Montes Garcia, ISIS, University of Strasbourg and CNRS, France)

while the end of the first meeting day included a visit at the MARCO museum for the registered participants!

The second day of the meeting opened with an exciting keynote given by Clement Sanchez (CNRS-UPMC-College de France, Paris) with title 'Integrative chemistry of functional nanostructured and hierarchically structured inorganic and hybrid materials', see photo above. Additional talks during the second day of the meeting included:

- Primary cilia in health and disease (Martina Huranova, Czech Academy of Science, Prague, Czech Republic)

- The cellular microenvironment and submolecular control of their mechanosignaling in tendon tissue specification and function (Rui Miguel Andrade Domingues, International Iberian Nanotechnology Laboratory-INL, Braga, Portugal)

During both days of the conference, younger students and researchers had the opportunity to present their work through the format of 10-minute 'short talks'. Among these, the best oral communication award was given to Lara Gonzalez Cabaleiro (CINBIO, University of Vigo), who discussed her work on 'Development of plasmonic nanoparticle-bacterial biohybrids for cancer therapy and biosensing'.

Posters: A suitable avenue to demonstrate the progress of young talent

Also this year, poster sessions featured mostly a good blend of energetic, emerging students and investigators showcasing their research on nanomaterials and biomedicine. The best poster communication award was earned by Simão Teixeira for INL, Braga (Portugal). His poster was entitled 'Wireless modulation of stem cell mechanotransduction signalling using PIEZO-imprinted nanoswitches'. At the end of the meeting, participants agreed that they will meet again during the 9th CINBIO Annual Meeting, in summer 2026!

C2. Upcoming events of interest

UK-based events

UK and Ireland based events starting in late September 2025 the earliest that may interest our readers include:

1) International Conference on Nanomedicine and Nanobiotechnology (ICNB 2025): September 23-25, 2025, Cambridge

2) High-entropy alloy nanostructures: from theory to application Faraday Discussion, September 24-26, London
https://www.rsc.org/events/detail/77926/high-entropy-alloy-nanostructures-from-theory-to-application-faraday-discussion

3) International Particle Technology Forum, September 30, Teddington (London). Organisers: Royal Society of Chemistry - Particle Characterisation Interest Group (RSC-PCIG) & Institution of Chemical Engineers (IChemE)
https://www.rsc.org/events/detail/81977/international-particle-technologies-forumor use the QR-code:

4) Particle Science and Technology Symposium 2025: October 5-7, 2025, Edinburgh
5) 42nd Global Summit on Nanoscience and Technology, October 21-22, 2025 London. https://nanosummit.conferenceseries.com/
6) Global Nanotechnology Summit 2025: October 20-22, 2025, Manchester
7) Chemical Science symposium 2025: Chemistry of imaging, biosensing and diagnostics. November 18-19, 2025, London.
https://www.rsc.org/events/detail/81053/chemical-science-symposium-2025

8) Materials Chemistry poster symposium, 25 November 2025, London.
https://www.rsc.org/events/detail/81458/materials-chemistry-poster-symposium

9) Faraday Community poster symposium, 9 December 2025, London.
https://www.rsc.org/events/detail/81418/faraday-community-poster-symposium-2025

10) International Conference on Environmental Biotechnology and Sustainability: December 30, 2025, Edinburgh
11) Bridging the gap from surface science to heterogeneous catalysis Faraday Discussion, 20-22 April 2026, London
https://www.rsc.org/events/detail/80739/bridging-the-gap-from-surface-science-to-heterogeneous-catalysis-faraday-discussion

Non - UK and Ireland events

1) NanoBalkan Conference, 29 Sept-03 Oct 2025, Tirana, Albania
https://www.nanobalkanconf.com/2025/

2) 248th ECS (Electrochemical Society) Meeting, 12-16 October, Chicago, USA
https://www.electrochem.org/248

3) NANOCON (17th International Conference on Nanomaterials), 15-17 October 2025, Brno, Czech Republic
https://www.nanocon.eu/en/

4) International Conference on Particle-Based Methods (PARTICLES 2025) October 20-22 2025, Barcelona, Spain.
https://particles2025.cimne.com/objectives

5) MATSUS Fall 2025 (Materials for Sustainable Development Conference), 20-24 October 2025, Valencia, Spain
https://www.nanoge.org/MATSUSFall25/home

6) Pancyprian Chemistry Conference 19-22 November, Nicosia, Cyprus
Chemistry Cyprus - 1ο ΠΑΓΚΥΠΡΙΟ ΣΥΝΕΔΡΙΟ ΧΗΜΕΙΑΣ

7) MRS Fall Meeting & Exhibit, 30 Nov-5 Dec., Boston, USA
https://www.mrs.org/meetings-events/annual-meetings/2025-mrs-fall-meeting

8) International Conference on Environmental Biotechnology and Food Security: December 30, 2025, Geneva, Switzerland
9) 7th International Caparica Symposium on Nanoparticles/Nanomaterials & Applications (7th ISN2A-2026), January 25-29, 2026, Caparica (Lisbon area), Portugal https://isn2a2026.com/
10) 5th International Conference on Nanomaterials Applied to Life Sciences (NALS 2026) March 11-13, Vigo, Spain https://nals2026.com
11) MATSUS Spring 2026 (Materials for Sustainable Development Conference, March 23-27, Barcelona, Spain https://www.nanoge.org/MATSUSSpring26/home
12) 15th International Conference on the Scientific and Clinical Applications of Magnetic Carriers (15th MagMeet), May 26-29, 2026, Sorbonne University, Paris, France https://magneticmicrosphere.com/meeting-fifteenth

The PCIG is always happy to hear about up-and-coming events that our members are interested in. If you have any suggestions for events to be included in our newsletters, please contact us and we will include these in our next edition.

CONTACT US

Visit our own website for further information: https://pcig.co.uk/ or go to our official RSC-website:

https://www.rsc.org/membership-and-community/connect-with-others/through-interests/interest-groups/particle-characterisation/

Do you have any questions, feedback or are you willing to contribute as a collaborative writer? Please email the RSC-PCIG Particle Newsletter Team via: **Particlenewsletter@gmail.com** and we will get back to you.