HIGHLIGHTS

A1. Discrete Chiral Nanostructures: Precision Construction and Chiroptical Advancements

A2. Fit for purpose - Tailoring the Activation of 3D-printed Electrodes Toward Clinical Sensing

A3. Challenges in measuring particles within biological media

13.07.2026

Recent Event Review - University of Leeds, Facility Day



Newsletter 11 (PCIG N11)

Welcome to the eleventh edition of our newsletter!

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RSC INTEREST GROUP
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CHARACTERISATION

Newsletter 11 (PCIG N11) - 13.07.2026

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 eleventh edition (April 2026 – June 2026), focuses on the following topics:

A. Research Highlights by University of Zhengzhou on 'Discrete Chiral Nanostructures: Precision Construction and Chiroptical Advancements" and by **University of Chemistry and Technology Prague** on 'Fit for purpose - Tailoring the Activation of 3D-printed Electrodes Toward Clinical Sensing'. **Our editorial team** provides a highlight on 'Challenges on measuring particles within biological media'.

B. Get to know: inspiring stories by Dimitrios Tsikritzis, Anastasios Papavasileiou and Guangchao Zheng.

C. Update corner: 'Facility day' event at the Univ. of Leeds and 'Pint of Science' in Vigo.

D. Brain teasers & science: The Particle Puzzle Lab and Particle Quest games are there to make you think and explore!

Editorial team: **Anna Anandita, Mel Disher, Okba Al Rahal, Stefanos Mourdikoudis, Sayantan Das, Tien Quach**

Graphics team: **Pantelis "Leon" Xydias** and **Viktoriya Ivasiv**

We would like to express our great appreciation to the PCIG Committee for encouraging and advising us to issue a new edition of PCIG Newsletter. Many thanks for the contribution from the people who are willing to cooperate 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. Discrete Chiral Nanostructures: Precision Construction and Chiroptical Advancements

Written by Dr. Guangchao Zheng, editorially coordinated by Stefanos Mourdikoudis

Introduction

Chirality, the geometric property of an object that is not superimposable on its mirror image, plays a fundamental role across scales, from the helical structure of DNA to the enantioselectivity of enzymatic reactions. At the nanoscale, the integration of chirality with plasmonic materials has opened unprecedented opportunities for manipulating light-matter interactions. However, a key challenge remains: *how to precisely construct discrete chiral nanostructures with controlled handedness and how to translate their unique chiroptical properties into practical applications.*

In this research highlight, we present our group's recent advances across three interconnected case studies. First, we demonstrate the precision construction of intrinsically discrete chiral Au nanorods (dc-Au NRs) and core-shell architectures with tunable chiroptical activity, achieved through seed-mediated growth strategies. Second, we explore circularly polarized photocatalysis using twisted Pd nanoarrays on dc-Au NRs super-heterostructures, which exhibit handedness-dependent catalytic activity under circularly polarised light. Third, we develop chiral plasmonic sensors platforms based on physical and chemical imprinting strategies, including colorimetric glucose detection, SERS-based enantiomeric discrimination, and chiral Co3O4 nanozymes for chiral amino acid sensing. Therefore, these efforts aim to establish a unified framework for designing, fabricating, and applying chiral nanomaterials.

Case Study 1: Constructing Intrinsically Discrete Chiral Nanostructures - Discrete Chiral Au Nanorods

Synthetic control over nanoscale handedness

The controlled synthesis of intrinsically discrete chiral plasmonic nanoparticles, where chirality arises from the twisted atomic lattice and morphology of the nanoparticle itself, rather than from adsorbed chiral molecules, remains a fundamental challenge. Using a seed-mediated growth approach in the presence of chiral surfactants, we have developed a robust method for producing dc-Au NRs with tunable chiroptical activity (Figure 1A-B). (*Angew. Chem. Int. Ed.*, 2018, 57, 16452-16457; *Nano Res.*, 2022, 15, 6574; *Chem. Soc. Rev.*, 2021, 50, 3738-3754)

Unlike assembled Au NRs which exhibit weak and nondurable chiroptical response, our dc-Au NRs display strong plasmonic circular dichroism (PCD) bands across the visible to near-infrared region.

By systematically varying the seed concentration and growth kinetics, we demonstrated that the longitudinal surface plasmon resonance (LSPR) position and the corresponding PCD intensity can be independently and precisely tuned (**Figure 1C**).

Furthermore, we extended this synthetic strategy to core-shell architectures, including c-Au@Ag and c-Au@TiO_2 nanorods. Interestingly, coating the chiral Au core with a Ag shell led to the emergence of new PCD bands in the near-UV region, providing direct evidence of chirality transfer from the metal core to the Ag shell. These findings establish a platform for designing intrinsically chiral nanostructures with precisely tailored optical activity, laying the foundation for their subsequent functional applications.

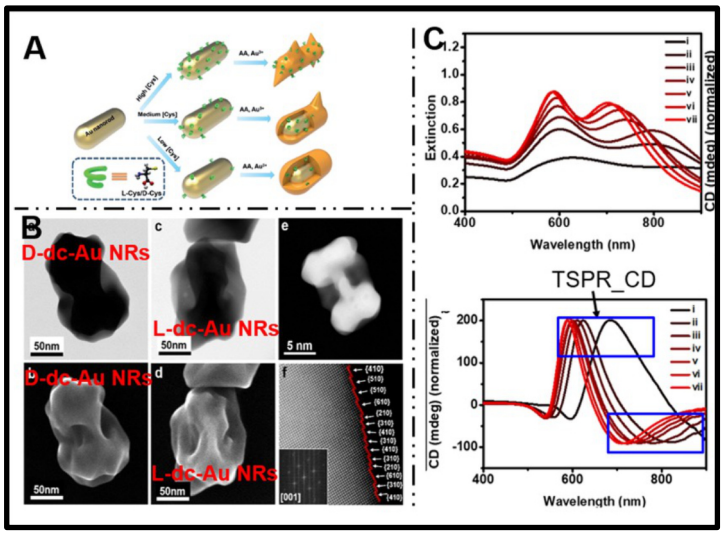

Figure 1. (A) Schematic illustration of the seed-mediated synthesis of chiral metal nanostructures using chiral stimuli (reproduced from *Angew. Chem. Int. Ed.*, 2018, 57, 16452-16457). (B) Representative morphological characterization and (C) tunable plasmonic circular dichroism (CD) peaks of discrete chiral Au nanorods (dc-Au NRs) (reproduced from *Nano Res.*, 2022, 15 (7), 6574)

Case Study 2: Circularly Polarized Photocatalysis

From structural chirality to enantioselective light-driven chemistry

Having established reliable synthetic routes to intrinsically chiral plasmonic nanoparticles, we next sought to harness their unique chiroptical properties for photocatalysis. Specifically, we asked whether the chiral electromagnetic field and spin-polarized hot electrons generated on chiral nanostructures could be used to drive enantioselective chemical reactions under circularly polarised light (CPL).

Our recent work on twisted Pd nanoarrays on dc-Au NRs super-heterostructures (Adv. Sci., 2025, 12, 2502848) provides a definitive answer. Conventional wisdom held that growing a catalytic layer (e.g., Pd) onto chiral plasmonic nanoparticles would quench their chiroptical response. Contrary to this expectation, we developed a synthetic methodology in which Pd nanoarrays are epitaxially and densely grown with a twisted lattice on discrete chiral Au nanorods (Pd-on-cAuNRs) (**Figure 2A**). The resulting super-heterostructures not only retain but in some cases exhibit strong chiroptical performance (**Figure 2B**). Remarkably, these Pd-on-cAuNR super-heterostructures display handedness-dependent catalytic activity. Under unpolarized light, the D- and L-enantiomers of the catalyst showed similar performance. However, under CPL irradiation matching the handedness of the nanostructure, the photocatalytic activity was boosted by a factor of two compared to the opposite CPL

polarization. Mechanistic studies, supported by theoretical simulations and chiral photocurrent measurements, revealed that the chiral electromagnetic field selectively enhances the generation and extraction of hot electrons from the Pd nanoarrays, thereby improving charge separation and reducing electron-hole recombination (**Figure 2C**).

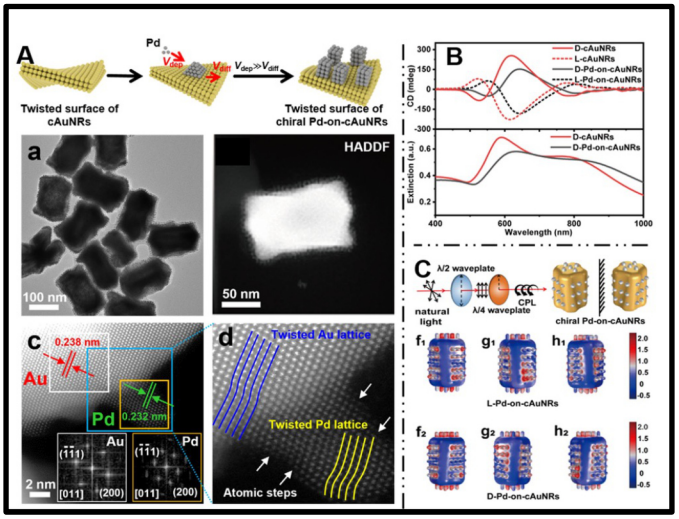

Figure 2. (A) Schematic illustration of the precise synthesis of twisted Pd nanoarrays on discrete chiral Au nanorods (dc-Au NRs). (B) Corresponding chiroptical response. (C) Simulated circularly polarized electromagnetic field distribution around dc-Au NRs. (Reproduced from *Adv. Sci.*, 2025, 12, 2502848.)

Case Study 3: Chiral Plasmonic Sensors

A Unifying Framework: Chiral Imprinting Strategies

We provide a comprehensive framework for chiral plasmonic sensors based on the enantio-interaction between the chiral targets and chiral medium surrounding chiral nanoparticles (**Figure 3A**). Importantly, chemical imprinting uses chiral selectors (molecules, peptides, MIPs) for stereoselective recognition, while physical imprinting relies on intrinsic chiral geometries (twisted surfaces, helical morphologies) to generate asymmetric electromagnetic fields (**Figure 3B**). The synergistic effect between both strategies offers the highest enantioselectivity and is broadly applicable to CD, colorimetry, SERS, PL, CPL, and electrochemical sensing modalities.

3.1 Chiral Nanozymes for Colorimetric Glucose Detection

We developed a colorimetric glucose detection platform based on the peroxidase (POD)-like activity of dc-Au NRs (**Figure 3C**, from *Adv. Opt. Mater.*, 2025, 13, 2403422) The dc-Au NRs catalyse TMB oxidation by H_2O_2, producing blue oxTMB (λ= 652 nm). D-dc-Au NRs exhibit higher catalytic efficiency than L-dc-Au NRs, with Michaelis constants (Km) of 0.33 mM for TMB and 1671 mM for H_2O_2.

POD-like activity is strongly polarization-dependent: LCP enhances L-dc-Au NRs activity by 2.13-fold, while RCP increases the activity of D-dc-Au NRs by 2.22-fold. Finite-difference time-domain (FDTD) simulations show that CPL induces stronger local field enhancements (>1.0) compared to LP light (~0.68). Integrating with glucose oxidase enables glucose detection with chirality- and polarization-dependent LOD. Under RCP, D-dc-Au NRs achieve an LOD as low as 5.1 μM, offering a simple, visual strategy for point-of-care diagnostics

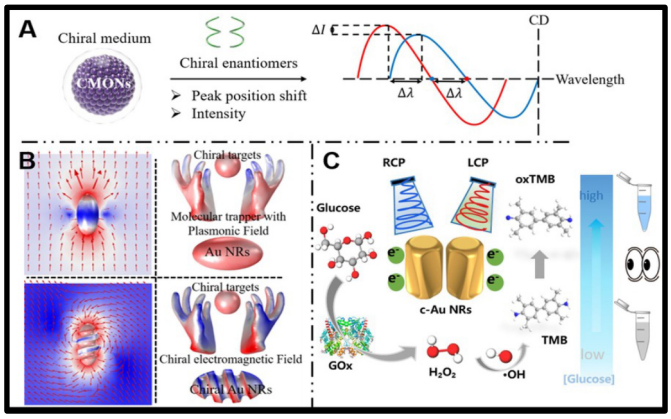

Figure 3. (A) Schematic illustration of chiral plasmonic sensors based on enantioselective interactions between chiral targets and a chiral medium surrounding chiral nanoparticles (reproduced from *Adv. Opt. Mater.*, 2023, 11, 2202859). (B) Chemical and physical chiral imprinting strategies for chiral plasmonic sensors (reproduced from *Angew. Chem. Int. Ed.*, 2025, 64, e202514816). (C) Colorimetric sensing of glucose using dc-Au NR sensors (reproduced from *Adv. Opt. Mater.*, 2025, 13, 2403422).

3.2 Dual Chiral Imprinting for SERS-Based Enantiomeric Discrimination

We developed a dual chemical/physical chiral imprinting strategy on discrete homochiral Au nanohelicals (dc-Au NHs) for highly sensitive SERS-based enantiomer discrimination (*J. Colloid Interf. Sci.*, 2026, 705, 139513). The platform integrates two orthogonal mechanisms: (i) a chemical recognition layer of 4-mercaptopyridine (MPY) that forms enantioselective hydrogen bonds with target molecules; and (ii) an intrinsic chiral electromagnetic field from the nanohelical geometry that provides physical amplification. This dual-imprinting strategy achieves LODs of 10^{-7} M for chiral alcohols and 10^{-6} M for tryptophan, with RSD < 7%. PCA confirms complete enantiomer separation at ≥ 10^{-6} M with 85% confidence. The 85% confidence level reported in our PCA analysis refers to the statistical confidence of the cluster separation between L- and D-enantiomers in the PCA score plot, rather than the classification accuracy of a predictive model. Specifically, it indicates that at concentrations ≥ 10^{-6} M, the spectral clusters of the two enantiomers are completely separated with 85% statistical confidence, meaning that the observed separation is unlikely to be due to random variation.

3.3 Chemical Chiral Imprinting for Amino Acid Sensing – Chiral Co3O4 Nanozymes

We developed histidine-mediated chiral Co_3O_4 NPs for enantiomeric discrimination of thiol-containing amino acids based on a chemical chiral imprinting strategy (*Small*, 2023, 19, 2205187). The ultrasmall NPs (1.9-2.2 nm) exhibit a g-factor up to 0.02, with mirror-image CD peaks at 535 and 660 nm. The Co3O4 surface is functionalised with chiral histidine (His) via imidazole-cobalt coordination. Target enantiomers (cysteine/penicillamine) competitively displace histidine through stronger thiol-cobalt binding, altering the Co^{2+}/Co^{3+} ratio and producing characteristic CD spectral changes. On Co_3O_4@L-His NPs, D-penicillamine causes a progressive red-shift and intensity decrease of the 357 nm CD peak, while L-penicillamine leaves the peak position unchanged, and an opposite trend is observed for Co_3O_4@D-His NPs. This mirror-image response enables unambiguous discrimination down to 10 μM. DFT calculations confirm that penicillamine has a higher adsorption energy (-132.4 kcal mol^{-1}) than histidine (-87.8 kcal mol^{-1}), thermodynamically driving ligand exchange. The strategy is specific to thiol-containing amino acids, establishing chiral transition metal oxides as a new platform for enantioselective chemical imprinting sensing.

A2. Fit for purpose - Tailoring the Activation of 3D-printed Electrodes Toward Clinical Sensing

Written by Anastasios Papavasileiou, editorially coordinated by Stefanos Mourdikoudis

Introduction

The wide accessibility of additive manufacturing (well known as 3D printing) enables the construction of objects with intricate geometries that are difficult or impossible to produce using conventional manufacturing methods. The cost has significantly decreased, and the design constraints were limited. The fast and on-demand fabrication of objects render additive manufacturing highly attractive to both the general public and the scientific community.

Fused deposition modeling has been at the forefront of the 3D printing techniques, thanks to the ease of use and simplicity. It enables the rapid fabrication of parts from a broad range of thermoplastic materials while requiring relatively simple hardware and processing conditions. Thermoplastic materials such as polylactic acid (PLA) and acrylonitrile butadiene styrene (ABS) are heated and extruded through a nozzle, then deposited layer by layer to build the object as they cool and solidify.[1]

The integration of carbon allotropes such as graphene, carbon black and carbon nanotubes in thermoplastic materials allows the fabrication of conductive objects and unlocks a wide range of applications. Among the fields benefiting from this advancement is electrochemical sensing, which leverages these materials to develop functional and customizable sensing platforms of intricate geometries that were impossible to achieve using other fabrication methods (e.g., screen printing).[2]

Nevertheless, commercially available conductive filaments are not intended specifically for electrochemical applications, resulting in 3D printed electrodes with poor electrochemical performance due to the partial or complete coverage of conductive sites by the insulating polymer matrix. As a result, recent research has focused on the activation of 3D-printed electrodes to enhance their electrochemical performance. These activation treatments aim to remove or modify the insulating polymer layer at the electrode surface, thereby exposing a greater number of conductive carbon sites, increasing the electroactive surface area, and improving electron transfer kinetics.[3]

Activation Method Selection

The choice of an activation method for 3D-printed electrodes should not rely exclusively on performance metrics but should also consider the requirements of the intended application and the analyte of interest. Most studies assess the effectiveness of electrode activation using common redox probes (e.g., hexacyanoferrate) rather than the target analyte itself. As a result, activation strategies that yield modest performance improvements in hexacyanoferrate are frequently considered unsuitable, even though they may still generate a strong and analytically useful signal for the target analyte and provide adequate performance for the intended application.

In contrast, the highlighted research demonstrates how the hexacyanoferrate redox probe can be employed not merely as a benchmark to evaluate and judge the electrochemical performance of 3D-printed electrodes, but rather as a tool to monitor, tailor, and optimize their electrochemical properties (**Figure 1**).

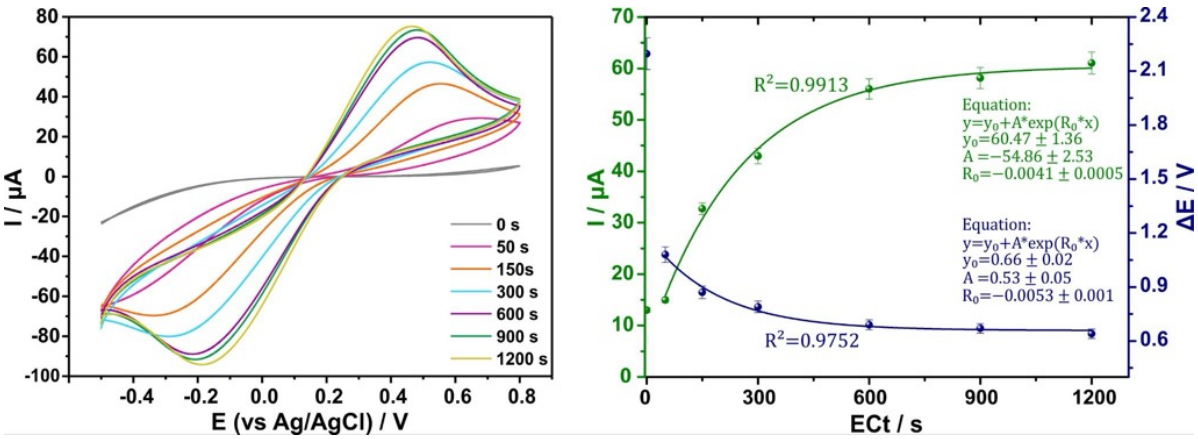

Figure 1. Evaluation of electrochemical activation effects on sensor performance. Left: cyclic voltammograms in the presence of 0.5 mM hexacyanoferrate(III) (at a scan rate of 25 mV s^{-1}) acquired after conditioning for 0-1200 s. Right: changes in peak current and peak potential separation with activation duration.

In this work, the 3D printed electrodes were activated in a 0.1 M PBS at 1.8 V for various time intervals. The electrochemical properties of the electrodes were evaluated by cyclic voltammetry using 0.5 mM hexacyanoferrate(III) and a series of electroactive analytes, including ascorbic acid, 1,3,5-trinitrobenzene, hydroquinone, epinephrine, and serotonin, each investigated separately. In parallel, two distinct electrode geometries were examined to assess the influence of the activation method on electrodes with different layouts and structural designs.

The peak-to-peak separation of the CV in the presence of hexacyanoferrate (III) is larger than the values typically considered desirable for electrochemical sensing applications, as reported in the literature. Nevertheless, it remains a valuable parameter for guiding the optimization of electrode performance prior to its evaluation with the target analyte while it does not reflect in the electrochemical performance of the 3D printed electrodes as it was evaluated for various analytes (**Figure 2**).

The activation duration influences the performance of 3D-printed electrodes to varying degrees depending on the analyte under investigation. In all cases, the shortest activation duration resulted in the most pronounced improvement relative to the non-activated electrode. Further prolongation of the activation treatment continued to enhance electrode performance, leading to greater electrocatalytic activity, as evidenced by the shift of the oxidation potential toward lower values, and a larger electroactive surface area, as indicated by the increased peak current response.

In what concerns the influence of electrode layout, three distinct behaviors were observed. For analytes such as serotonin, the electrode geometry had a negligible effect on performance, both before and after activation. In the case of ascorbic acid, the two layouts exhibited similar performance prior to activation, whereas differences emerged following activation. For analytes such as 1,3,5-trinitrobenzene, hydroquinone, and epinephrine, electrode layout significantly influenced the electrochemical response both before and after activation. Consequently, each combination of electrode geometry and activation state (non-activated and activated) led to a distinct performance, resulting in four clearly differentiated performance profiles.

Application

The ability to tailor the electrochemical performance of 3D-printed electrodes through controlled activation treatments opens new opportunities for the development of sensors intended for demanding clinical environments, such as operating rooms, where stringent requirements for sterility are prerequisite. One such example represents the Lab-on-a-Scalpel sensing device, in which a fully 3D-printed electrochemical sensor is incorporated on the backside of a surgical scalpel. The biocompatible character of PLA as the matrix material in combination with the use of activation methods that eliminate the need for harsh chemicals, hazardous waste disposal, and complex instrumentation, allow Lab-on-a-Scalpel to be deployed safely and freely in the operating theater.

This construction of such multifunctional device is able to minimize the number of instruments required during surgery while promoting the intraoperative monitoring of patients through chemical analysis of biomarkers. By consolidating multiple diagnostic functions into a single platform, it streamlines surgical workflows, reduces procedural complexity, and enables clinicians to make faster and more informed decisions at the point of care. The long waiting times behind biochemical test ordering, and receiving of lab reports can be significantly decreased. Lab-on-a-Scalpel holds promise to become an essential tool for robotic-assisted

surgery improving the accuracy of the procedure by adjusting its function in response to the biochemical profile of the patient.[5]

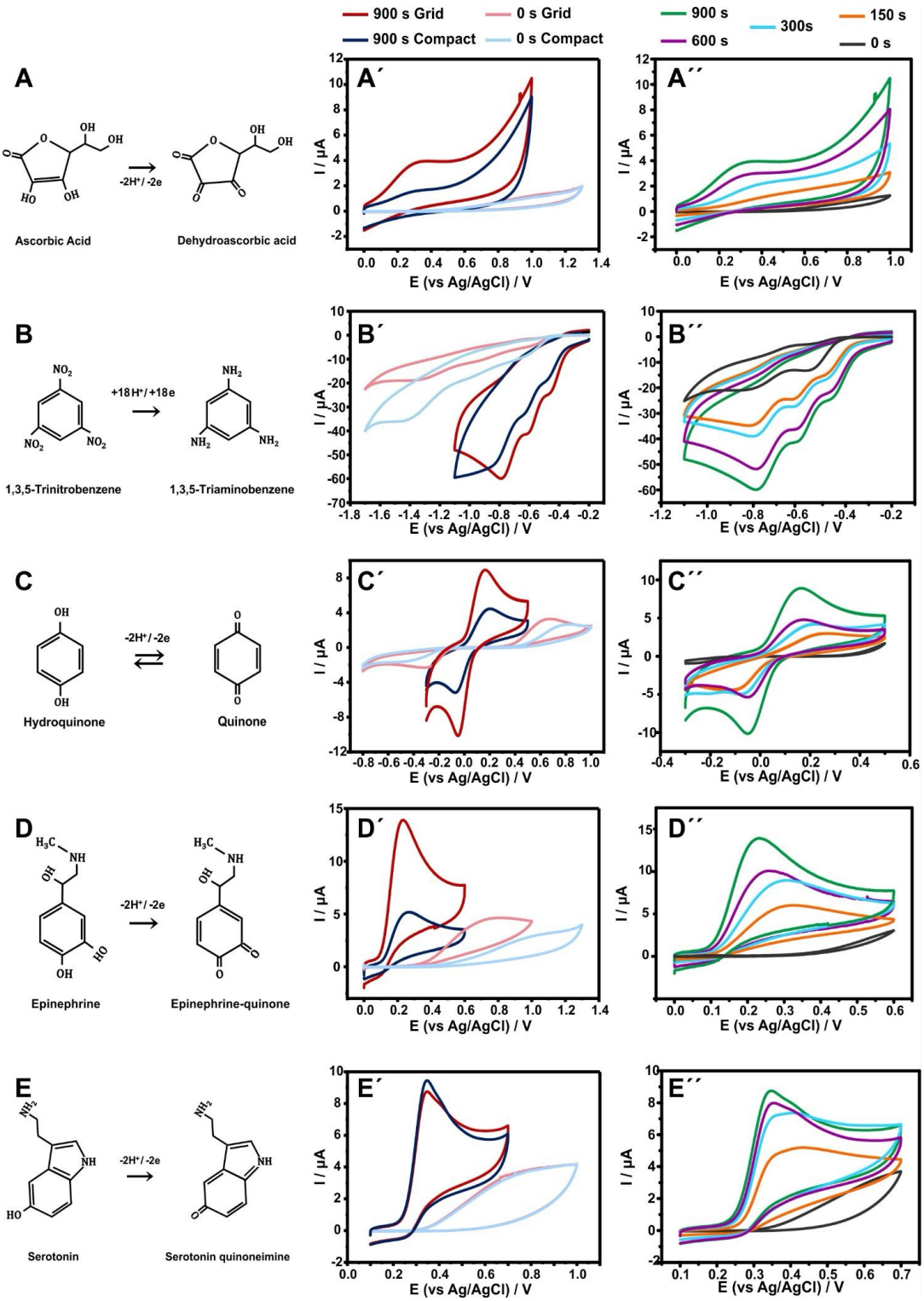

Figure 2. Comparison of electrochemical responses for five model analytes: (A) ascorbic acid, (B) 1,3,5-trinitrobenzene, (C) hydroquinone, (D) epinephrine, and (E) serotonin. The corresponding redox mechanisms are shown on the left. Cyclic voltammograms in panels (A′–E′) demonstrate the effect of electrode layout (grid and compact) before and after activation, whereas panels (A″–E″) present the improvement of the voltammetric signals by the prolongation of the activation, highlighting the enhanced sensing performance and analyte accumulation over time.[4]



Figure 3. Graphical illustration of Lab on Scalpel sensing device depicting its potential capabilities.

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A3. Challenges in Measuring Particles within Biological Media

Written by Anna Anandita

The transition of engineered particles from laboratories to clinical and environmental applications depends on an accurate physical characterization. However, once a particle enters complex biological environments, such as plasma, culture media, or physiological fluids, its structure undergoes significant transformation. Particles, at times, undergo continuous alterations in their surface properties, aggregation states, and stability in their surroundings (Baer, 2018). Accurate measurements of particle size, surface charge, and concentration in such environments may become highly challenging. Higher concentrations of proteins, salts, and complex matrices interfere with the analytical signals of the particle and lead to inconsistency in data across published literature (Baer, 2018). Thus, this article summarizes major challenges of particle measurement in biological media, compares key analytical techniques used in these matrices, and presents best practices for robust characterization.

One of the primary challenges lies with the complexities and interference of biological media. Unlike deionized water, a biological system is highly unpredictable. The primary interfering factors comprise protein corona, high ionic strength, viscosity, and heterogeneity of the matrix. First, upon the introduction of particles into biological fluids, their high surface-to-volume ratio and increased surface energy cause the adsorption of surrounding biomolecules, primarily proteins (Baer, 2018; Zanganeh et al., 2016). This creates a biomolecular coating known as protein corona. There are two main types of corona, hard and soft, as shown in the Figure below. Hard corona comprises tightly bound protein molecules with high affinity, which causes slow exchange, whereas soft corona comprises loosely associated and rapidly exchanging proteins.

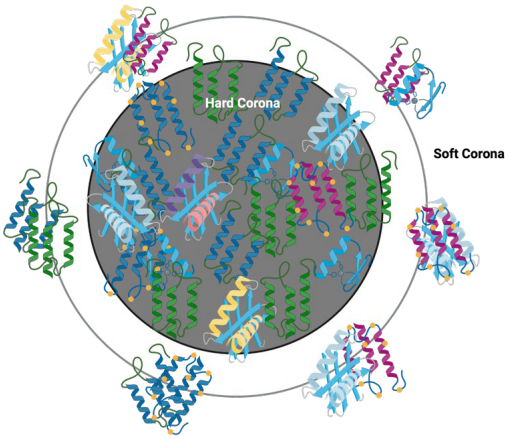

Figure 1. Protein corona formation on particles in biological media. The dark grey sphere represents the nanoparticle core; the inner adsorbed layer constitutes hard corona of tightly bound proteins with long residence times. The outer light grey boundary indicates soft corona of dynamic layer of loosely associated proteins that continuously exchange with proteins in the surrounding biological medium.

Protein corona changes the particle identity on a fundamental scale (Karakoti et al., 2020). Thus, analytical instruments measure the hydrodynamic size and surface properties of the particle-protein complex, rather than those of the bare inorganic or polymer core. Additionally, unbound, highly abundant free proteins such as serum albumin or immunoglobulins generate strong background signals that completely mask particle signals (Balog et al., 2015). Secondly, biological media are abundant in electrolytes, such as Na^+, Cl^-, K^+, and Ca^{2+}. Contrary to their electrostatically stabilized behavior in pure water, the matching surface charges of the particles repel each other and prevent aggregation. Higher concentrations of salt- screen these surface charges and disrupt the electrical double layer in accordance with DLVO theory (Balog et al., 2015). Devoid of this electrostatic barrier, attractive van der Waals forces dominate and cause particles to rapidly agglomerate (Baer, 2018). Interestingly, this alteration in the size distribution occurs in real time during analysis! In fact, high salt (e.g. NaCl) concentrations in a given sample may also deteriorate the reliability of measurements of certain properties such as the ζ-potential. Lastly, due to the non-Newtonian, crowded, and highly viscous nature of matrices, standard sizing techniques majorly depend on the assumption of unhindered Brownian motion of particles in a simple Newtonian fluid. Various components of matrices, such as cellular debris and lipid structures, also cause alteration of local viscosity and form physical barriers, and distort diffusion-based measurement techniques.

In order to address these interferences, a combination of optical, scattering, and separation techniques is employed by several researchers. The choice of the right tool entails an understanding of the methodology and its interaction with biological matrices. The table below summarizes the techniques with their unique advantages and limitations in biological media.

Table 1: Different milling techniques used particle size reduction

Sl. No.	Technique	Operating principle	Advantages	Limitations	Ref.
1	Dynamic light scattering (DLS)	Measures fluctuations in scattered light in order to calculate the hydrodynamic size through the Stokes-Einstein equation	• Fast • Non-destructive • Highly sensitive to smaller particles in clear suspensions	• Highly susceptible to multiple scattering • Requires high dilution which may shift equilibrium of the protein corona • Fails in high-protein/salt matrices • Background noise from free proteins/salts masks signals	(Hallan et al., 2021)
2	Depolarized dynamic light scattering (DDLS)	Utilizes the depolarized component of scattered light from anisotropic or modified particles	• Suppresses background noise from the isotropic matrix such as proteins or salts • Allows real-time, in situ tracking of particles and corona complexes	• Requires specific optical anisotropy or labeling; instrument access is limited • Not suitable for perfectly spherical, non-labeled particles that lack inherent optical anisotropy	(Balog et al., 2015)
3	Nanoparticle tracking analysis (NTA)	Uses a laser microscope and camera to track individual particle trajectories and calculates an average size distribution	• Tracks individual particles • Handles moderately polydisperse samples far better than DLS • Provides accurate particle concentration	• Lower size limit depends on the refractive index of the particle • Inefficient for low-index polymers with size < 30 nm • High background noise with high concentration of unbound free-protein	(Li and Lee, 2020)

4	Fluorescence nanoparticle tracking analysis (F-NTA)	Tracks fluorescently labeled particles via video microscopy	• Eliminates background noise from unlabeled or unbound free proteins or matrix • Essential for complex biological media where light scattering creates excessive noise	• Requires fluorescent labeling • Potential dye leaching or photobleaching	(Kowkabany and Bao, 2024)
5	Asymmetric Flow Field-Flow Fractionation (AF4)	Uses a laminar flow and a perpendicular cross-flow field inside a channel to separate particles by diffusion coefficient before detection	• Physical separation technique • Can resolve highly complex, polydisperse biological mixtures without altering or destroying protein corona	• Long method development times of around 1-3 h • Expensive equipment ($50000-150000) • Potential sample loss due to particles sticking to the channel membrane	(Böhmert et al., 2020)
6	Small-Angle X-ray Scattering (SAXS)	Measures the scattering of X-rays at very small angles to evaluate electron density contrasts	• Provides precise structural, shape, and thermodynamic data of particles • Distinguishes core size from corona thickness	• Requires high-intensity X-ray sources • Costly equipment • Analysis of multicomponent biological mixtures is mathematically complex	(Li and Lee, 2020)

Evaluating particles in biological environments requires strict adherence to experimental protocols to prevent deviations from the samples and further ensure data reproducibility. During the isolation of particle-protein complexes for further downstream analysis, such as mass spectrometry, the choice of separation techniques becomes highly essential. One such recommended technique is prolonged centrifugation, which alters the protein corona and causes aggregation or pellets-abundant free proteins with the proteins alongside the nanoparticle-bound (hard corona) proteins (Böhmert et al., 2020). For sensitive soft corona systems, due to the background interference noted in the table above, techniques such as size-exclusion chromatography (SEC) or AF4 are recommended to isolate particle signals from matrix noise due to their less perturbing nature.

To ensure reproducibility at the sample preparation stage, researchers must move beyond standard laboratory protocols. Intense ultrasonication should be avoided during dispersion, as the highly localized shear forces can induce irreversible changes in nanoparticle morphology and fracture soft-corona complexes, thus altering the particle morphology. During the analysis, physiological temperature of 37 °C must be maintained to replicate real-world behavior since temperature-dependent fluctuations in protein binding kinetics and solvent viscosity directly affect the hydrodynamic radius and may render room-temperature measurements physiologically irrelevant. Furthermore, relying on characterization in aqueous phase is insufficient as it does not account for ionic strength and protein-induced screening of electrical double layers. In order to mitigate the inherent background noise in biological matrices, workflows must incorporate blank samples of pure biological media to enable baseline subtraction of native biomolecule scattering. Lastly, all reports should detail precise media composition and pre-measurement sample preparation, as the ionic strength and protein-to-nanoparticle ratios influence the thermodynamic stability of the complexes.

Also, traditional light-scattering techniques can struggle in highly scattering biological matrices. In this context, it would be recommended to use fluorescence-based single-particle tracking (fSPT) or NTA in fluorescence mode to isolate particles from background noise (Böhmert et al., 2020; Cedervall et al., 2007). It is important not to rely on a single technique, as it cannot provide a comprehensive profile. Best practices demand combining complementary methods (Hallan et al., 2021; Mourdikoudis et al., 2018). A few recommended ones are mentioned below.

- Use DLS to quickly screen for massive aggregation.
- Use NTA to determine high-resolution number distributions and concentrations.
- Use liquid-state metrics (like DDLS or SAXS) alongside Cryo-TEM to verify true core morphology versus hydrated hydrodynamic volume.

The transition of engineered particles to complex biological environments needs a transfer from static water-based characterization to treating particles as dynamic, environment-responsive systems. The limitations, specifically protein corona-induced masking, matrix-dependent salt screening and hydrodynamic interference, cannot be alleviated with a single measurement technique. The choice of technique should be controlled by the specific biological challenge, such as F-NTA to bypass matrix-generated background noise, AF4 to preserve sensitive corona-particle complexes during separation, and Cryo-TEM to correlate hydrodynamic measurements with physical reality. Thus, it is essential to move beyond the assumptions of pure water, adopt extrinsic analytical techniques, and standardized experimental variables, when possible and needed to resolve the hindrances in data reproducibility. Finally, characterization needs to be treated as a comprehensive process rather than an isolated stage of testing, to ensure the accurate capture of physical identity of a particle in its physiological context.

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B. 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 that happened). We look forward to hearing from you.

Get to know

Collected by Stefanos Mourdikoudis

Dr. Dimitrios Tsikritsis



Dimitrios Tsikritsis is a Higher Scientist in the Surface Technology Group at the National Physical Laboratory (NPL), where he develops and applies advanced optical spectroscopy and imaging techniques to address challenges in healthcare, pharmaceuticals, and biomedical research. His expertise includes Raman spectroscopy, Stimulated Raman Scattering (SRS) microscopy, multimodal imaging, and the development of measurement approaches that improve the reliability, reproducibility, and quantitative performance of analytical techniques.

He holds a PhD from the University of Edinburgh and has extensive experience in vibrational spectroscopy for biomedical and pharmaceutical applications. His work focuses on quantitative imaging, spectroscopy standardisation, and the translation of emerging photonic technologies into practical tools for industry and healthcare. Dimitrios has led international interlaboratory studies and contributed to ISO and European standardisation activities aimed at improving confidence in advanced spectroscopic measurements.

Passionate about advancing measurement science, he works closely with industrial, academic, and regulatory partners to develop robust methodologies that support innovation in biomedical imaging and spectroscopy. He is particularly interested in quantitative optical imaging and its wider adoption by the pharmaceutical industry for drug development and label free particle characterisation, as well as by the diagnostics sector for improved healthcare.

Mr. Anastasios Papavasileiou



My name is Anastasios Papavasileiou, and most people call me Tasos which is a common short form of my first name. I come from Kastoria, a small town in northern Greece. I am a chemist specializing in analytical electrochemistry and sensing technologies, and I am currently pursuing a PhD at the University of Chemistry and Technology in Prague, Czech Republic.

My research focuses on the development of electrochemical sensing platforms, with particular emphasis on emerging technologies for electrode fabrication and surface modification. I am especially interested in bipolar electrochemistry and its applications in analytical chemistry and sensor development.

Growing up in a small town, I had very few opportunities to engage in science outside of school. Even so, it was enough to inspire both me and my twin sister to pursue careers in science; me in chemistry and her in physics. We share the same goals and concerns, and we have continued to motivate and inspire each other throughout our journeys. Of course, none of this would have been possible without the support of our mother, who worked tirelessly to give us the opportunity to pursue our dreams and build the lives we wanted.

Chemistry is more than a profession to me; it is a lifelong passion that gives me a sense of purpose. I have always been fascinated by the way matter transforms through chemical reactions and how atoms interact to form molecules that ultimately shape everything around us. Chemistry represents the bridge between inanimate and the living world, connecting the fundamental principles of matter with the complexity of living organisms. Studying chemistry has been incredibly satisfying, but the greatest reward comes from applying that knowledge to create and develop new systems that can have a real impact. Pursuing research in chemistry gives me the opportunity to work at the cutting edge of science, witnessing and contributing to discoveries and innovations that have the potential to shape the future.

While choosing chemistry as my major was an easy and natural decision, identifying the specific field in which I wanted to build my research career was far more challenging. In my mind, I have envisioned myself conducting research across many different domains of chemistry. The more I learned about chemistry, the more difficult it became to choose a single direction, as every field seemed fascinating in its own unique way. In my effort to merge as many domains of chemistry as possible, I chose analytical chemistry. Its broad scope allows me to engage with environmental, food, and pharmaceutical chemistry through the study of different analytes and the analysis of diverse sample types. As for the method of analysis, electrochemistry was particularly challenging for me to understand, and that was exactly what made me want to master it.

The most exciting moment for me is the spark of a new research idea. My mind immediately starts exploring the entire concept, imagining the experiments, the potential outcomes, and whether the idea is actually feasible. This is both my greatest motivation and the source of my anxiety. Research is unpredictable, and things rarely go exactly as planned. As a result, the original idea often evolves along the way, shaped by unexpected challenges, new findings, and experimental limitations. In the end, the starting concept may reach reality in a transformed state, often in ways that are different from what I initially envisioned. And in cases where the idea never reaches the stage of realization, it becomes a valuable learning experience with a potential to strengthen and better plan the next scientific endeavor.

In my free time I like to participate in various group activities such as sports and dancing, where I have the chance to acquire new skills, improve my fitness and socialize at the same time. Some of my favorite activities have been Argentine Tango and Crossfit, while occasionally depending on the place I live and the opportunities I have, I attempt to engage with new activities. Additionally, I enjoy learning new languages and exploring new cultures through travelling.

Dr. Guangchao Zheng

'Curiosity and the drive to bridge fundamental physics, chemistry and materials with real-world applications fuel my motivation in research'



"Exploring chirality, for me, is a philosophical journey from the breaking of microscopic symmetry to the meaning of macroscopic existence. This revolutionary concept, bridging physics, chemistry, and life sciences, is not only the key to unlocking light energy utilization and quantum devices but also a prism through which we understand the origin of life's own 'handedness.' When we handcraft a chiral nanostructure and witness how it deflects light, we are essentially conversing with the universe's most fundamental law of 'left and right.' It teaches us that perfection is found in imperfection; that symmetry breaking is the very engine driving matter toward life."

Guangchao Zheng is an Associate Professor in the School of Physics at Zhengzhou University, China, where he leads the Colloidal Physics Group. His research focuses on precise synthesis of functional nanomaterials, plasmon-enhanced spectroscopy, photocatalysis and chiral nanophotonics. He spoke to us about his journey and vision.

My name is Guangchao Zheng. I am a physicist by training, but my work sits at the intersection of chemistry, materials science, and optics. I obtained my PhD from the University of Vigo in Spain, working with Professors Jorge Perez-Juste and Luis Liz-Marzán. After postdoctoral research at the Hong Kong Polytechnic University, I joined Zhengzhou University in 2019. My group is dedicated to understanding how symmetry breaking at the nanoscale, or chirality, can be used to control light-matter interactions, with a strong emphasis on applications in energy conversion and polarized devisors.

What I love most about my research is the ability to start from a fundamental question: Can a single nanoparticle carry intrinsic, programmable handedness without assembled superstructures? To answer it, we used chiral molecules like cysteine as molecular calligraphers. In our work, we create discrete chiral nanorods with twisted surface, each a self-contained universe of chirality. Their circular dichroism signals were stable and tunable. Stepping back, we asked a deeper question in one of our papers: What truly defines a chiral plasmonic nanoparticle? We proposed the concept of "discrete chiral plasmonic nanoparticles" - with each particle being intrinsically, stably, and programmably chiral, distinct from assemblies or lithographic patterns. What I enjoy most is the full arc: from a quiet question, to synthesis and assembly, and then to a unifying concept embraced by the community. It is where poetry meets precision, and a small initial idea grows into new strategies for chiral sensing, circularly polarized photocatalysis, and photonic devices.

What I enjoy most about my work is the ability to start from a fundamental physics question, such as "How does the twisted lattice of a palladium nanoarray on a chiral gold nanorod affect the behaviour of hot electrons?" - and translate that into the design of a functional material. That journey from a theoretical concept to synthesising a new super-heterostructure in a beaker, and then demonstrating its enhanced performance, is a perfect blend of fundamental curiosity and purposeful innovation. The coolest moment, however, is when you see the data confirming a counter-intuitive hypothesis. For a long time, it was thought that growing a functional layer like palladium onto a chiral nanoparticle would eliminate its chiroptical response; nevertheless, we discovered that if you grow it as twisted, epitaxial nanoarrays rather than a smooth shell, you can preserve and even boost both chirality and catalytic activity. The moment when we saw that first TEM image where the palladium atoms are perfectly aligned in a twisted pattern on the gold surface was exhilarating - a beautiful, clear image that tells you that nature agrees with your idea.

I would advocate for more funding mechanisms that truly support high-risk, high-reward exploratory research. Many current grant systems favour incremental work with guaranteed outcomes. Truly disruptive science, like discovering a new chiral growth mechanism or a novel chiral photon-chiral structure with electron spin effect, often requires months of failed experiments. The pressure to publish quickly can discourage young researchers from pursuing these challenging but potentially transformative paths. A system with a dedicated pool of funding for key potential projects, evaluated by scientists known for their creativity, could unlock the next generation of breakthroughs in nanophotonics and quantum materials.

My curiosity was sparked by simple, beautiful phenomena: the vibrant colours of soap bubbles or the way a CD splits light. I became a scientist to understand the "why" behind these everyday wonders. What gets me up in the morning is the potential for a small discovery in the lab today to have a big impact tomorrow. Knowing that my work on chiral photocatalysis could one day contribute to more efficient solar fuel production, helping to address the energy transition, is a powerful motivator. Also, mentoring my graduate students and watching them grow into independent thinkers is a source of immense pride and joy.

I find balance in nature. I enjoy taking long walks, which gives my mind the space to wander and often leads to unexpected solutions to research problems. I also love spending time with my family. Stepping away from the lab and the computer to focus on them provides the mental clarity and energy I need to return to my work with a fresh perspective.

My advice is to cultivate patience and resilience. Nanoscience is difficult; you will spend many weeks optimizing a synthesis that fails, or trying to align a laser setup that seems impossible. Do not be discouraged. Embrace failure as a learning step. Also, learn to truly collaborate. Today's biggest challenges, from quantum computing to sustainable energy, require expertise in physics, chemistry, biology, and engineering. Don't be afraid to reach out to experts in other fields. And finally, always keep the big question in mind. It's easy to get lost in the details of a single experiment. Remember why you started, and what fundamental problem you are trying to solve.

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!

C. UPDATE CORNER

C1. a) Recent Event Review - University of Leeds, Facility Day

Collected by Mel Disher

Two of the PCIG's committee members recently attended an event featured in the PCIG NL10. I caught up with Ben Douglas and Han Wu after visiting the University of Leeds, School of Earth, Environment and Sustainability, for the Facility Day.

The event was organised by Lesley Neve and Helena Brown and themed around Particle Characterisation in Atmospheric Ice Nucleation. During the course of the event, attendees were shown instruments for characterising particle size and shape, low temperature X-ray diffraction and PINE - a Portable Ice Nucleation Experiment system. Professor Benjamin Murray discussed how these techniques can be used in relation to research into cloud formation.



Han and Ben kindly answered some questions I had about the event.

Was this the first time you've attended Facilities day on Particle Characterisation? What were your initial impressions?

Ben: This was the first time I had been to an event of this format. There were a small number of attendees which really gave us a chance to chat to each other, and to see the lab instrumentation up close.

Did you go to the conference with any specific goals?

Ben: I went to find out about the technical capabilities and how these were applied to the research which takes place in this School. I was particularly interested in how these complemented the instrumentation that I manage, and how we might be able to help each other out or work together in future.

What were the take-home messages for you:

Ben: Water always melts at 0 °C, but doesn't always freeze at that temperature! I was aware of supercooling, but was amazed to learn that water can remain liquid down to around -40 °C in the absence of a source of nucleation.

Did you make any useful contacts at the conference?

Han: The Facility Day organised by the two very talented Research Technical Professionals (RTPs) at Leeds University truly demonstrated the value of peer learning. As a Facility Manager at UCL, I enjoyed it immensely and learned a lot myself.

It was especially inspiring to see how Helena is using maths and coding to develop a program that compares experimental data from two instruments with different measurement methods.

I really hope to see more RTP-for-RTP training initiatives like this, an excellent way to support knowledge transfer and share best practice across the tech community.

Ben: It was great to meet RTPs from other institutions who are working with similar equipment. We were able to share experiences and how we meet challenges that we had in common. Although the labs we visited are only a walk across campus for me, I had never been in them before. As a result, Lesley and Helena who organised the workshop are planning to come to have a look at the lab I manage.

Next time I am involved in purchasing new lab equipment I will definitely spend time contacting colleagues such as the attendees to get their opinions and maybe find out about instrumentation that I am not aware exists.



Can you think of any initiatives that PCIG could employ in the future to help first time attendees get more out of their conferences?

Organising a meet up of e.g. RTPs or PhD students – conferences can be daunting for first time attendees (though not this one!) and being able to meet peers could be supportive.

Any other comments on the event you would like to include?



Lesley and Helena obtained support from the Engineering & Physical Sciences Research Council-funded 'TSNROKS' project to cover attendee expenses and catering. They have both attended PCIG events in the past and were inspired to run an RTP-focused event so that attendees could discuss technique development in the Particle Characterisation field. They planned the type of event they would love to attend: in-depth techniques, networking and a seminar to tie everything together.
They really enjoyed welcoming technicians from across the UK to their labs, sharing their workflows, and discussing the possibility of creating a national network of Particle Characterisation RTPs.

C1. b) Pint of Science ES – Vigo – An event which helps to bring research more close to the general public

By Stefanos Mourdikoudis

Pint of Science is an international science dissemination festival that was founded in the **United Kingdom** in **2013** with the aim to facilitate the diffusion of science and research closer to the general public through informal and accessible discussions being held in local venues like bars and cafeterias. Since its creation, the initiative has expanded rapidly across the world and is now organized annually in dozens of countries, including **Spain**, where it has become one of the **largest science outreach events**. By moving scientific discussions from universities and research centres into everyday social environments, Pint of Science provides a unique opportunity for researchers based in local institutions to share their work with diverse audiences, fostering dialogue between scientists and society while highlighting the relevance of research to everyday life.

The **2026 edition** of Pint of Science in **Vigo** took place from **18-20 May** and was organized at the café De Catro a Catro and at the bar El Castro. Researchers from different disciplines presented their work through short, engaging talks **designed for non-specialist audiences**, followed by lively discussions and questions from attendees. The event once again demonstrated the strong public interest in science and innovation, offering an accessible platform for exchanging ideas and showcasing research activities carried out locally and via international collaborations, too. Through its relaxed and welcoming atmosphere, Pint of Science Vigo contributed to strengthening the connection between the scientific community and the wider public, while promoting scientific culture within the region.

https://pintofscience.es/dondeequipos/equipo/Equipo%20PONTEVEDRA%20-%20Vigo/

Highlights from the 2026 edition of Pint of Science at Vigo


Xosé Henrique Costas González presenting his talk

At the cafeteria De Catro a Catro, the **first day** of the meeting started with an attractive talk presented by Xose Enrique Costas Gonzalez (Prof. at Univ. of Vigo) regarding the unique, centuries-old local **galician dialect** of the city of Vigo. Laura Busto, researcher on the institute 'Sanitaria Galicia Sur' spoke about the **role of artificial intelligence in cardiology**. On the same day, at the bar El Castro, Sara Cameselle, who is working at the IIM-CSIC, described the use of models, **algorithms** and data analysis toward a **better understanding of marine ecosystems**. Antonio Figueras, also based at the IIM-CSIC, explained how an apparently 'simple' organism such as the **mussel**, is in fact quite sophisticated and **can adapt** to extreme differences in the temperature or salinity of the medium in which it lives, while it can also resist against sea pollution or pathogen microorganisms.

The **second day** of the meeting at the Catro a Catro included first a special session called '**Pint Kids**', where Maria Pazo Rodriguez (CINTECX, Univ. of Vigo) and Raquel Nogueira (IIM-CSIC) attempted to make science and research more attractive to a group of 25 kids in the age range 8-12. Maria focused on the importance of **clean water** for a healthy life for mankind and animals, while Raquel explained the significance of **food safety**. Diejo Cajaraville (AtlaNTTic, Univ. of Vigo) analysed how **Artificial Intelligence** is progressing toward models which respect increasingly personal data. Patricia Gonzalez (CINTECX, Univ. of Vigo) described, in her talk, how apparently immobile objects, like **buildings, may seem to stay 'intact'**, however, in reality, they are c**onstantly fighting against different factors** such as their own weight, wind, rain, soil – and s**cientific methods give us a helping tool** to study such dynamic phenomena. At the El Castro, Javier Perez, Laura Abalo and Yolanda Fernandez, all working at iLingua (Univ. of Vigo) spoke about the **difference of the structure between written and oral communication** in daily life. Following this, a presentation by Alicia Senti and Virginia Acuña (also from iLingua, Univ. of Vigo) described the **difference in communication style between women and men**, and how these differences can sometimes lead to misunderstandings, based on the different ways of interacting and socializing that both genders learn since their childhood.

On the **third day** of the event, Maria Mayan (CINBIO, Univ. of Vigo) demonstrated at the café De Catro a Catro scientific progress on **cancer studies** during the last decades. For instance, nowadays a range of different types of **nanomaterials** are increasingly explored thanks to their promising activity in cancer treatment via diverse approaches. She also explained knowledge gaps and challenges currently in place, such as cancer initiation mechanisms and treatment difficulties.

Saida Otrolano (IIS-Galicia Sur) spoke about **rare diseases**, especially regarding recently developed treatments and persisting challenges. She also discussed that a better understanding of the rare diseases will help toward a better comprehension of the more frequent ones. At the El Castro venue, Marta Costas Rodriguez (CIM, Univ. of Vigo) illustrated that variations in the proportion of stable **metal isotopes** (e.g. copper or iron ones) have become key tools for investigating processes ranging **from planetary body formation to human physiology**. Finally, Carla Cameselle Llanos (Cispac, Univ. of Vigo) showed that **fish byproducts** (skins, bones and heads), though they are often treated as waste, they actually contain hidden proteins that convert into **health-boosting marine peptides**.

During the three days of the event, the **Pint of Science Vigo** team organized interactive **quiz sessions** during the breaks between talks. These activities were specifically designed to engage more profoundly the venue audience. The numerous participants in each venue, spanning a broad age range, enjoyed testing their knowledge across various scientific trivia topics. Challenges included filling in missing words in scientific definitions or identifying famous scientists from photographs. Top-scoring participants were awarded various goodies and small gifts provided by the event sponsors.

C2. Upcoming events of interest

UK-based events

UK and Ireland-based events starting during the next months that may interest you include:

1) Bath EIS Summer School 2026 (Theory and Practice of Electrochemical Impedance Spectroscopy), 14-17 July 2026, Bath

https://www.bath.ac.uk/publications/2026-electrochemistry-winter-and-summer-schools-flyers/attachments/EIS-Summer-School-Flyer-2026.pdf

2) 16th International Conference on Metamaterials, Photonic Crystals and Plasmonics, 14-17 July 2026, Dublin, Ireland

https://metaconferences.org/META26/index.php/META

3) RSC Summer Celebration 2026 - celebration the impact of chemistry, 20/07/2026, London

https://www.rsc.org/events/find-an-event/rsc-summer-celebration-2026

4) RSC Applied Symposium: Interfaces and polymers for a sustainable future, 23/07/2026, London, UK

https://www.rsc.org/events/find-an-event/rsc-applied-symposium-interfaces-and-polymers-for-a-sustainable-future

5) Electrochem 2026, 23-25 August 2026, York

https://www.rsc.org/events/find-an-event/electrochem-2026

6) UKPorMat Early Career Researchers Conference, 24-25 August 2026, Liverpool

https://www.rsc.org/events/find-an-event/ukpormat-early-career-researchers-conference

7) Annual Meeting of the British Society of Nanomedicine, 26-28 August 2026, UCL East, London

https://www.eventbrite.com/e/bsnm-annual-meeting-2026-tickets-1982894524902?aff=oddtdtcreator

8) IMC21 (The 21st International Microscopy Congress), 31/8 - 4/9/2026, Liverpool

https://www.imc21.org.uk/

9) RSC Chemical Nanoscience & Nanotechnology ECR Symposium, 7 September 2026, Glasgow

https://www.rsc.org/events/find-an-event/rsc-chemical-nanoscience-nanotechnology-ecr-symposium

10) MICRA 2026 (Meeting of Inorganic Chemists Recently Appointed), 7-9 September 2026, Cambridge

https://www.rsc.org/events/find-an-event/micra-2026

11) Sustainable chemistry of electrofuels and electrochemicals Faraday Discussion, 14-16 September 2026, Manchester

https://www.rsc.org/events/find-an-event/sustainable-chemistry-of-electrofuels-and-electrochemicals-faraday-discussion

12) The 6th International Conference on Materials (ICM 2026): from Innovation to Translation, 16-18 September 2026, Manchester

https://www.mdpi.com/journal/materials/events/19272

13) 2nd International Conference on Green Materials and Manufacturing Technology (GMMT 2026), 9-11 October 2026, Cambridge

https://www.rsc.org/events/find-an-event/2nd-international-conference-on-green-materials-and-manufacturing-technology-(gmmt-2026)

14) Chemical Science symposium 2026: Digital chemistry in the age of AI and machine learning, 29-30 October 2026, London

https://www.rsc.org/events/find-an-event/chemical-science-symposium-2026-digital-chemistry-in-the-age-of-ai-and-machine-learning

15) Basics of Particle Characterisation Workshop, 12 November 2026, Luton

https://www.anton-paar.com/uk-en/services-support/seminars/detail/event/basics-of-particle-characterisation-workshop/

16) Horizons Symposium 2026: (Nano)catalysis, 12-13 November 2026, London

https://www.rsc.org/events/detail/83161/horizons-symposium-2026-nano-catalysis

17) Faraday Community poster symposium, 30/11/2026, London

https://www.rsc.org/events/find-an-event/faraday-community-poster-symposium

18) The Drug Delivery to the Lungs (DDL) conference, 9-11 December 2026, Edinburgh

https://ddl-conference.com/

19) Materials Chemistry poster symposium, 14/12/2026, London

https://www.rsc.org/events/find-an-event/materials-chemistry-poster-symposium

20) Corrosion from fundamentals to extremes Faraday Discussion, 7-9 April 2027, Manchester

https://www.rsc.org/events/find-an-event/corrosion-from-fundamentals-to-extremes-faraday-discussion

21) Surface-enhanced Raman Scattering (SERS) Faraday Discussion, 14-16 April 2027, London

https://www.rsc.org/events/detail/82371/surface-enhanced-raman-scattering-faraday-discussion

22) **Forge 2027 (RSC-PCIG flagship biannual conference in particle science and technology)**, 26-27 May 2027, University of Strathclyde, Glasgow

https://pcig.co.uk/the-forge-2027/

23) 18th International conference on materials chemistry (MC18), 5-8 July 2027, Cardiff

https://www.rsc.org/events/find-an-event

24) 22nd International conference on biological inorganic chemistry (ICBIC22), 25-30 July 2027, York

https://www.rsc.org/events/find-an-event/icbic

Non – UK and Ireland events of possible interest

1) International Workshop on Ferroelectric Nitrides (IWFN), 16-17 July 2026, Ann Arbor, Michigan, USA

https://icmbe2026.eecs.umich.edu/iwfn

2) 9th CINBIO annual meeting, 20-21 July 2026, Vigo, Spain

https://cinbio.es/difusion/divulgacion/ix-annual-meeting/

3) Doctoral Conference in Energy, Technologies and Industrial Processes 2026, 21-22 July 2026, Vigo, Spain

https://dcetip26.es/

4) 25th International Conference on Advanced Nanomaterials, 22-24 July 2026, Aveiro, Portugal

https://nanoportugal.com/

5) Metal-halide perovskites and their derivatives (Unconventional Semiconductors and their applications - Gordon Research Conference), 26-31 July 2026, Portland, Maine, USA

https://www.grc.org/unconventional-semiconductors-and-their-applications-conference/2026/

6) International Focus Workshop 'Exploring two-dimensional nanomaterials for future applications', 27-29 July 2026, Dresden, Germany

https://www.pks.mpg.de/xplrtd26

7) 4th Materials & Nanomaterials international conference, 27-29 July 2026, Las Palmas de Gran Canaria, Canary islands, Spain

https://nanomaterials-europe.eu/

8) The 48th PIERS (Progress in Electromagnetics Research Symposium), 27-31 July 2026, Suzhou, China

https://suzhou2026.piers.org/

9) Magnetic Frontiers 2026 - Spintronics for Computing, 3-7 August 2026, Hong Kong SAR

https://magfrontiers.hkust.edu.hk/#/

10) International symposium on nano & supramolecular chemistry (ISNSC 2026), 9-12 August, Denpasar, Bali, Indonesia

https://isnsc2026.uksw.edu/

11) SURFCAT Summer School 2026 'The Science of Sustainable Fuels and Chemicals', 9-14 August 2026, Skaelskor, Denmark

https://physics.dtu.dk/research/sections/surfcat/summerschool2026

12) Materials, Methods & Technologies - 28th International Conference, 13-16 August 2026, Burgas, Bulgaria

https://www.sciencebg.net/en/conferences/materials-methods-and-technologies/

13) 10th European Conference on Molecular Magnetism (ECMM 026), 17-20 August 2026, Copenhagen, Denmark

https://www.conferencemanager.dk/ecmm/conference

14) Samarkand International Symposium on Magnetism, 17-23 August 2026, Samarkand, Uzbekistan

https://sism.samdu.uz/

15) ACS Fall 2026, 23-27 August 2026, Chicago, USA

https://www.acs.org/events/fall.html

16) 5th International Conference on Energy, Environment and Storage of Energy (ICEESEN 2026), 24-26 August 2026, Gazi University, Ankara, Turkey

https://iceesen.gazi.edu.tr

17) Catalytic CO2 conversion conference, 25-28 August 2026, Copenhagen, Denmark

https://www.ccc2026.org/

18) 21st International Conference on Defects Recognition, Imaging and Physics in Semiconductors, 30/8 - 3/9/2026, Warsaw, Poland

https://drip21.pl/

19) 8th International Conference on Ferromagnetic Shape Memory Alloys (ICFSMA 2026), 31/08 - 03/09/2026, Kassel, Germany

https://dgm.de/icfsma/2026/conference/scope

20) 39th European Conference on Surface Science (39th ECOSS), 31/08 - 04/09/2026, Oslo, Norway

https://www.ecoss2026.net/

21) 2nd International Circular Hydrometallurgy Symposium, 2-4 September 2026, Mechelen, Belgium

https://ichs2026.cirmet.eu/

22) 7th International Congress on Biosensors, 2-4 September 2026, Ordu, Turkiye

https://biosensor2026.com/

23) International Congress on Separation and Purification Technology, 6-9 September 2026, Sitges, Spain

https://www.elsevier.com/events/conferences/all/international-congress-on-separation-and-purification-technology

24) 40th Conference of the European Colloid & Interface Society, 6-11 September 2026, Granada, Spain

https://eventos.ugr.es/ecis2026/

25) 77th Annual Meeting of the International Society of Electrochemistry, 6-11 September 2026, Sydney, Australia

https://www.ise-online.org/meetings/annual77/#gsc.tab=0

26) IEEE 16th International Conference on 'Nanomaterials: Applications & Properties', 6-11 September 2026, Budva, Montenegro

https://ieeenap.org/

27) Nano Genova 2026, 7-11 September 2026, Genova, Italy

https://www.nano2026.com/

28) 17th Pannonian International Symposium on Catalysis, 7-11 September 2026, Mala Moravka, Czech Republic

https://pisc-conference.com/

29) 35th Annual Conference of the European Society of Biomaterials, 7-11 September 2026, Antwerp, Belgium

https://fems.org/35th-annual-conference-of-the-european-society-of-biomaterials-esb-2026/

30) Flatlands beyond graphene (Conference on 2D materials), 7-11 September 2026, Dresden, Germany

https://events.hifis.net/event/3442/

31) 4th Conference on Electron Microscopy of Nanostructures (ELMINA2026), 7-11 September 2026, Belgrade, Serbia

https://www.elmina.rs

32) Trends in Magnetism 2026, 7-11 September 2026, Milan, Italy

https://www.petaspin.com/tmag2026/

33) NaNax 11 (nanoscience with nanocrystals conference), 7-11 September 2026, Lecce, Italy

https://www.physik.uni-hamburg.de/nanax11.html

34) CLN 2026 (conference on magnetic thin layers and nanostructures, mostly for french-speaking scholars), 8-11 September 2026, Louvain-la-Neuve, Belgium

https://cln2026.sciencesconf.org/

35) 30th National Meeting on Medicinal Chemistry, 13-16 September 2026, Messina, Italy

https://nmmc2026.unime.it/

36) 22th Brazilian Meeting on Inorganic Chemistry, 13-16 September 2026, Armacao dos Buzios, Rio de Janeiro, Brazil

https://eventos.galoa.com.br/bmic-2026/registration/intro

37) 7th International Sodium Battery Symposium, 14-16 September 2026, Berlin, Germany

https://www.helmholtz-berlin.de/events/international-sodium-battery-symposium1/index_en.html

38) EMRS Fall Meeting & Exhibit (European Materials Research Society), 14-17 September 2026, Warsaw, Poland

https://www.european-mrs.com/meetings/2026-fall-meeting-exhibit

39) African-German Doctoral Summer School on Global Sustainability and Fair Research Partnerships, 14-18 September 2026, Hamburg, Germany

https://horizonresourcenetwork.org/project/summer-school-on-global-sustainability-and-fair-research-partnerships/

40) 9th Spanish Conference on Biomedical Applications of Nanomaterials (SBAN), 17-18 September 2026, Madrid, Spain

https://sban.es

41) 15th International Conference on Mechanical Technologies and Structural Materials, 17-18 September 2026, Split, Croatia

https://www.linkedin.com/posts/mtsm_call-for-papers-mtsm-2026-mtsm-2026-activity-7432712221404712961-6BF_/

42) 4th Global Summit on Advanced Materials (GAMSE26), 19-20 September, Prague, Czech Republic

https://gamse26.materialsummit.com/

43) Nanochemistry Camp 2026, 19-26 September 2026, Camping del Sole, Iseo, Italy

https://www.istiseo.org/courses/nanochemistry-camp-2026/

44) 7th International Energy Storage Materials Conference, 20-23 September 2026, Dresden, Germany

https://www.elsevier.com/events/conferences/all/energy-storage-materials-conference

45) 40th Panhellenic Conference on Solid State & Materials Science, 20-23 September 2026, Patras, Greece

https://matersci.upatras.gr/en/department-news/136-general-news/1696-xl-panhellenic-conference-on-solid-state-materials-science

46) EMLEM26 (Emerging Light Emitting Materials), 20-23 September 2026, Kallithea, Halkidiki region, Greece

https://www.nanoge.org/EMLEM26/home

47) Chirality @ The Nanoscale, 20-24 September 2026, Lipari, Italy

https://nanoscale.sciencesconf.org/?lang=en

48) 32nd Meeting of the Condensed Matter Division of the European Physical Society (OePG-CMD-Joint meeting), 20-25 September 2026, Graz, Austria

https://oepg-cmd-jointmeeting2026.uni-graz.at/en/

49) MNE 2026 - 52nd Micro + Nano Engineering Conference, 21-24 September 2026, Interlaken, Switzerland

https://mne2026.imnes.org/

50) Graphene Week 2026 (Graphene Flagship), 21-25 September 2026, Porto, Portugal

https://graphene-flagship.eu/events/graphene-week-2026

51) Autumn School in 'Molecular Simulations: Concepts & Methods', 24-26 September 2026, Ioannina, Greece

https://molsim2026.conf.uoi.gr/

52) World Congress on Nanomedicine, 27-30 September 2026, New Delhi, India

https://wcn2026.in/registration.html

53) 6th International Symposium on catalysis for clean energy and sustainable chemistry, 28-30 September 2026, Madrid, Spain

https://ccesc2026.com/

54) MSE 2026 (International Materials Science and Engineering Congress), 29/09 - 01/10/2026, Darmstadt, Germany & Online (hybrid)

https://mse-congress.com/

55) GLOW 2026 (The Global Conference for Women Leaders & Emerging Researchers in Materials Science), 29/09 - 01/10/2026, Nanyang Technological University, Singapore

https://www.ntu.edu.sg/mse/news-events/events/glow2026

56) NANOCON'26 - 18th International Conference on Nanomaterials - Research & Application, 30/9 - 2/10/2026, Brno, Czech Republic

https://www.nanocon.eu/en/

57) 9th International School of Biological Crystallization, 4-9 October 2026, Granada, Spain

https://www.isbcgranada.org/

58) Nanophotonics and Micro/Nano Optics International Conference, 5-7 October 2026, Roma, Italy

https://premc.org/conferences/nanop-nanophotonics-micro-nano-optics/registration/

59) NanoSpain Conference 2026, 5-8 October 2026, Tarragona, Spain

https://www.nanospainconf.org/2026/index.php

60) 18th Panhellenic Symposium of Catalysis, 8-10 October 2026, Kozani, Greece

https://catalysis18.chemeng.uowm.gr/

61) 21st World Congress on Materials & Nanoscience (WCMN 2026), 12-14 October 2026, Madrid, Spain

https://conferencesglobal.org/Materialscience/

62) 13th Aegean Analytical Chemistry Days (AACD 2026), 12-15 October 2026, Athens, Greece

https://aacd2026.gr/

63) SPICA 2026 (20th International Symposium on Preparative and Industrial Chromatography and Allied Techniques, 13-16 October 2026, Muttenz (Basel), Switzerland

https://www.spica2026.org/

64) InterNanoPoland conference (10th edition, science-to-business event in nanotechnology), 14-15 October 2026, Katowice, Poland

https://internanopoland.com/

65) International Conference on Energy Materials and Rechargeable Batteries, 14-17 October 2026, Faridabad, India

https://www.rsc.org/events/find-an-event/international-conference-on-energy-materials-and-rechargeable-batteries-2026

66) Micro Nano & Chips Tech 2026 (13th International Conference on Micro-Nanoelectronics, Nanotechnology and MEMS), 15-18 October 2026, Athens, Greece

https://2026.micro-nano.gr/

67) MicroTAS 2026, 30th International Conference on Miniaturized Systems for Chemistry and Life Sciences, 18-22 October 2026, Granada, Spain

https://microtas2026.org/

68) XIII Latin American Workshop on Magnetism, Magnetic Materials & their Applications, 19-23 October 2026, Natal, Brazil

https://www.law3m2026.org/

69) 11th Smart Materials and Surfaces (SMS) Conference, 21-23 October 2026, Seville, Spain

https://setcor.org/conferences/sms-2026

70) C-Horizon (Carbon Science and Technology Conference), 26-28 October 2026, Paris, France

https://carbonscitech.com/

71) MATSUS26 Fall - Materials for Sustainable Development Conference, 26-30 October 2026, Mallorca, Spain

https://www.nanoge.org/MATSUSFall26/home

72) JMC 2026 (Journees de la Matiere Condensee - Condensed Matter Physics Conference), 26-30 October 2026, Toulouse, France

https://www.nanoge.org/MATSUSFall26/home

73) NanoBalkan International Conference (4th edition), 26-30 October 2026, Tirana, Albania

https://www.nanobalkanconf.com/2026/

74) Beilsten Nanotechnology Symposium 27-29 October 2026, Limburg, Germany

https://www.beilstein-institut.de/en/symposia/shaping-the-future-of-nanotechnology/

75) Okinawa Colloids 2026 (an international conference on colloid & surface science), 1-6 November 2026, Okinawa, Japan

https://okinawacolloids.jp/

76) MMM'2026 - 71st Annual Conference on Magnetism and Magnetic Materials, 2-6 November 2026, Honolulu, Hawaii, USA

https://ieeemagnetics.org/event/conference/71st-annual-conference-magnetism-and-magnetic-materials

77) 5th International Congress of African Membrane Society (AMSIC 5) 'Towards a Sustainable Future with Membrane Science', 2-6 November 2026, Casablanca, Morocco

https://amsic5.sciencesconf.org/

78) Porous Materials for a Sustainable Future: A Mediterranean and Middle East Roadmap (Pore2MED), 8-11 November 2026, Ayia Napa, Cyprus

https://pore2med26.com/

79) RESCON Europe 2026 (Conference on Respiratory Drug Delivery & Connected Devices), 10-11 November 2026, Porto, Portugal

https://rescon-europe.com/about/

80) 1st Global MXene and 2D Materials Conference 2026 (GMXC2026), 11-14 November 2026, Suwon, South Korea

https://gmxc2026.com/index.php?GP=int/wm

81) 6th International Conference on Emerging Advanced Nanomaterials, 16/11/2026, Newcastle, Australia

https://www.rsc.org/events/detail/83095/6th-international-conference-on-emerging-advanced-nanomaterials

82) 4th Seminar on Rare-Earth Materials & Magnet Technology 2026, 16-17 November 2026, Stuttgart, Germany

https://www.msiport.com/msit-events/seminar-on-magnet-technology/seminar-2026/

83) International Conference 'Galician-Portuguese Chemistry Meeting', 18-20 November 2026, Pontevedra, Spain

https://www.encontrogalegoportugues.org/en

84) RSC First 2026: AI in Chemistry, 19-21 November 2026, Xiamen, China

https://rscfirst.org.cn/

85) IPEC 2026, International Process Engineering Conference, 22-25 November 2026, Tashkent, Uzbekistan

https://aidic.it/ipec2026/

86) Pan Africa Chemistry Network congress 2026 'Connecting chemical sciences, communities and sustainability', 22-26 November, Pretoria, South Africa

https://www.rsc.org/events/find-an-event/pan-africa-chemistry-network-congress-2026

87) NanoBio&Med2026 conference, 1-3 December 2026, Barcelona, Spain

https://www.nanobiomedconf.com/NBM26/index.php

88) SPASE - Sao Paulo Advanced School on Electrochemistry: From Sensing to Energy Conversion and Storage, 2-11 December 2026, Sao Paulo, Brazil

https://www.rsc.org/events/find-an-event/spase-sao-paulo-advanced-school-on-electrochemistry-from-sensing-to-energy-conversion-and-storag#CourseDetails

89) 6th International Caparica Christmas Conference on Translational Chemistry (IC3TC), 6-10 December 2026, Caparica, Portugal

https://ic3tc2026.com

90) Elecmol 2026 (11th International Conference on Molecular Electronics), 14-17 December 2026, Paris, France

https://elecmol26.sciencesconf.org/

91) IEEE Advances in Magnetics 2027, 7-10 January 2027, Bardonecchia, Italy

https://www.aim2027.it/

92) The 4th International Conference on Advancing Sustainable Futures (ICASF 2027), 13-14 January 2027, Abu Dhabi, UAE

https://www.adu.ac.ae/conferences-competitions/international-conference-on-advancing-sustainable-futures/the-4th-international-conference-on-advancing-sustainable-futures

93) 7th FEMS Industry Symposium, 14/01/2027, Frankfurt airport, Germany

https://fems.org/7th-fems-industry-symposium-on-digital-science-and-materials-innovation/

94) SPIE Photonics West, Conference BO601 ‘Colloidal Nanoparticles for Biomedical Applications XXII’, 30/01 - 04/02/2027, San Francisco, California, USA

https://spie.org/PW27B/conferencedetails/colloidal-nanoparticles-biomedical-applications

95) 4th Transnational Round Table on Magnonics, High-Frequency Spintronics, and Ultrafast Magnetism 15-19 February 2027, New Delhi, India

https://trtm2027.sciencesconf.org/

96) 3rd Edition of ‘Catalysis and Reaction Engineering’ conference, 22-24 February 2027, Los Angeles, California, USA.

https://reactionengineerings.com/

97) SPM Connect 2026 (Conference focused on Atomic Force Microscopy techniques), 23-25 March 2027, Boston, USA

https://www.techconnectworld.com/World2027/sym/SPMConnect.html

98) International Conference on Nanomedicine and Nanobiotechnology (ICONAN 2027), 31/03 - 02/04/2027, Paris, France

https://premc.org/conferences/iconan-nanomedicine-nanobiotechnology/

99) MATSUS Spring 2027 (Materials for Sustainable Development Conference), 19-23 April 2027, Barcelona, Spain

https://www.nanoge.org/MATSUSSpring27/home

100) Advanced models of human biology and disease: From organoids to New Approach Methodologies (NAMs) - Cell Press Symposium, 28-30 April 2027, Bruges, Belgium

https://cell-press-symposia.com/organoids-nams-2027/index.html

101) 9th European Symposium on Biomaterials and Related Areas (BioMAT 2027), 12-13 May 2027, Jena, Germany

https://dgm.de/biomat/2027/

102) 10th International Workshop 'Characterization of Porous Materials: from Angstroms to Millimeters' 23-26 May 2027, Garmisch-Partenkirchen, Germany

https://cpm-workshop.org/

103) 23rd International Conference on Magnetism (ICM), 14-18 June 2027, San Juan, Puerto Rico

https://icm2027.org/

104) CLAY 2027, 20-26 June 2027, Madrid, Spain

https://clay.aipea.org

105) European Polymer Congress 2027 (EPF2027), 5-9 July 2027, Riga, Latvia

https://epf2027.org/

106) Magnonics 2027 - 10th international conference on fundamentals and applications of magnons, 2-6 August 2027, Vienna, Austria

https://magnonics2027.univie.ac.at/

107) JEMS 2027 - Joint European Magnetic Symposia, 29/08 - 03/09/2027, Prague, Czech Republic

https://www.jems2027.eu

108) FEMS EUROMAT'27 - 19th European Congress and Exhibition on Advanced Materials and Processes, 12-16 September 2027, Graz, Austria

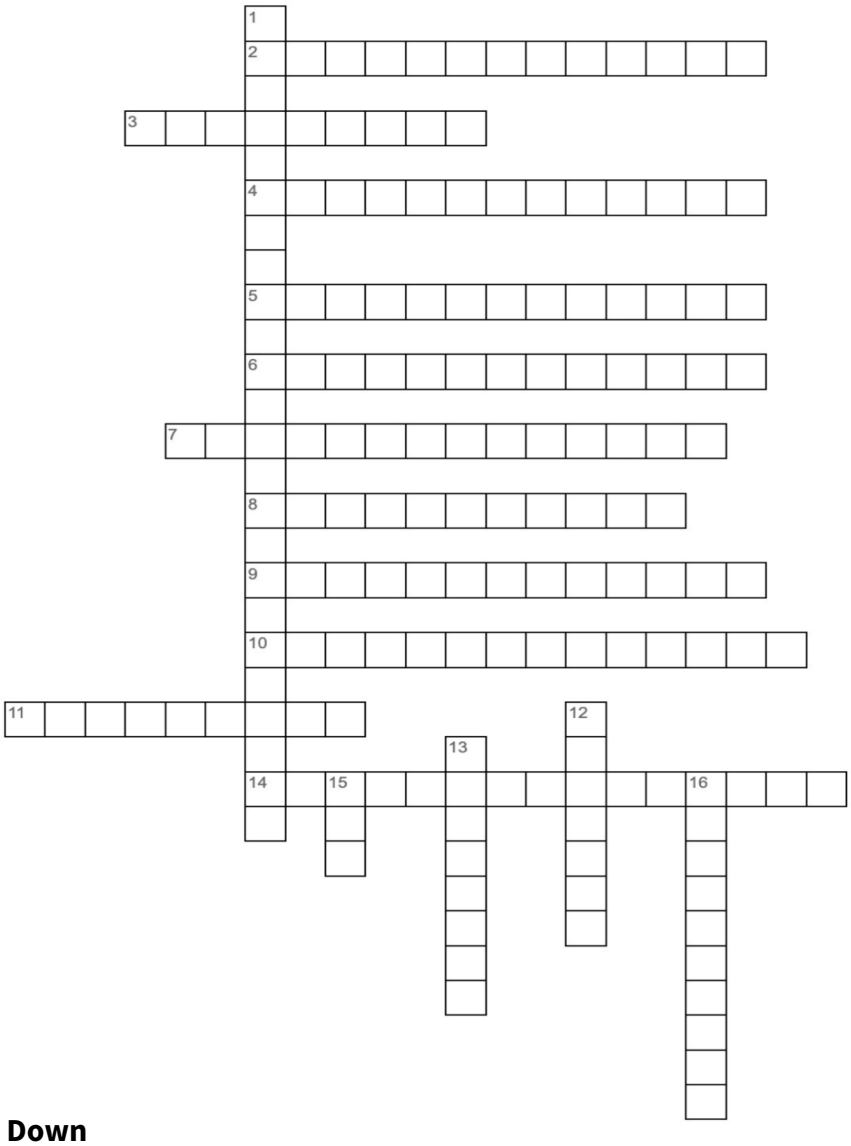
https://euromat2027.com/

D. BRAIN TEASERS & SCIENCE

The answers will be published in the next newsletter.

By Anna Anandita

THE PARTICLE PUZZLE LAB



Across

2 Process by which particles stick together to form larger masses

3 Mathematical solution that describes how spherical particles scatter light

4 Amount of a particular particle component present in a given volume or mass of a sample

5 Method to measure particle size by observing how fast particles settle in a fluid

6 Electrical potential at the surface of a particle, indicating its stability in a liquid

7 Tendency of a particle's surface to attract or be wetted by water

8 Total area of a particle's external surface, often measured by gas adsorption

9 Quantitative measure used in light scattering and is the ratio of scattered light intensity to incident light intensity

10 Random movement of particles suspended in a fluid

11 Measurement of pore sizes within a particle or filter, often by forcing a liquid through the material

14 Dimensionless number in predicting droplet and particle breakup in sprays that relates viscous forces to inertial and surface tension forces

Down

1 Range and frequency of different particle sizes in a sample

12 Traditional classification method that uses a mesh to separate particles by size

13 Measure of the void spaces within a particle or powder

15 Optical technique that tracks the Brownian motion of individual nanoparticles to determine size and concentration

16 Overall size, shape, and surface structure of a particle

PARTICLE QUEST

Instruction: Find all the listed words hidden in the grid. Words may appear horizontally, vertically, or diagonally, and can be read forwards or backwards.

Level - Medium

Y	G	M	G	C	B	K	W	V	P	L	T	O	J	E	Q	R	N	X	Y	P
S	N	P	N	B	Q	K	I	F	O	E	B	K	F	B	V	A	H	J	G	E
J	I	D	M	X	X	Z	I	Z	W	I	K	R	I	U	C	E	O	Z	R	V
R	D	G	D	G	C	I	T	Z	D	Y	H	I	H	Z	P	H	I	U	F	S
Q	N	E	R	S	A	E	B	T	E	B	X	T	B	S	O	S	T	P	B	N
G	I	A	B	R	M	R	Z	L	R	P	L	N	K	S	A	C	L	Y	R	A
L	R	C	A	G	G	R	E	G	A	T	E	B	R	E	A	K	A	G	E	S
L	G	G	L	A	L	C	T	Q	G	C	B	G	C	R	W	R	R	N	N	G
I	C	C	N	A	Z	L	U	E	F	N	A	R	F	M	K	J	O	W	H	N
M	I	G	O	P	S	Q	I	I	T	A	I	E	K	G	W	I	K	B	A	I
T	N	N	T	M	S	S	M	M	T	A	L	D	H	Z	T	N	R	E	M	H
E	E	I	M	M	M	P	I	T	L	C	G	H	N	A	D	V	P	P	M	S
J	G	L	I	B	A	I	R	F	I	L	E	E	Z	I	A	F	C	A	E	U
O	O	L	F	C	M	I	N	T	I	V	A	I	R	A	R	X	U	R	R	R
T	Y	I	T	T	T	J	R	U	H	C	N	B	U	G	T	G	R	T	M	C
C	R	M	O	I	Y	A	O	L	T	O	A	Y	Z	H	G	Q	O	I	I	V
A	C	Q	O	Z	P	P	V	F	R	I	C	T	S	Z	I	A	E	C	L	M
H	X	N	Q	M	P	A	Z	C	Q	T	O	Z	I	C	F	Z	X	L	L	R
C	U	C	F	N	G	H	I	V	T	K	G	N	K	O	N	M	W	E	M	S
G	A	V	A	L	K	M	O	N	V	S	P	T	E	Y	N	Q	B	P	A	T
O	K	K	I	D	N	P	J	Z	K	X	R	V	Q	G	F	T	X	U	J	L

COMMINUTION	**IMPACT**	**POWDER**	**PARTICLE**	**CRYOGENIC GRINDING**
MILLING	**SHEAR**	**PARTICLE**	**FRACTURE**	**MICRONIZATION**
GRINDING	**BALL MILL**	**CRUSHING**	**CLASSIFICATION**	**ATTRITION**
HAMMER MILL	**JET MILL**		**AGGREGATE**	**AGGREGATE BREAKAGE**

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.