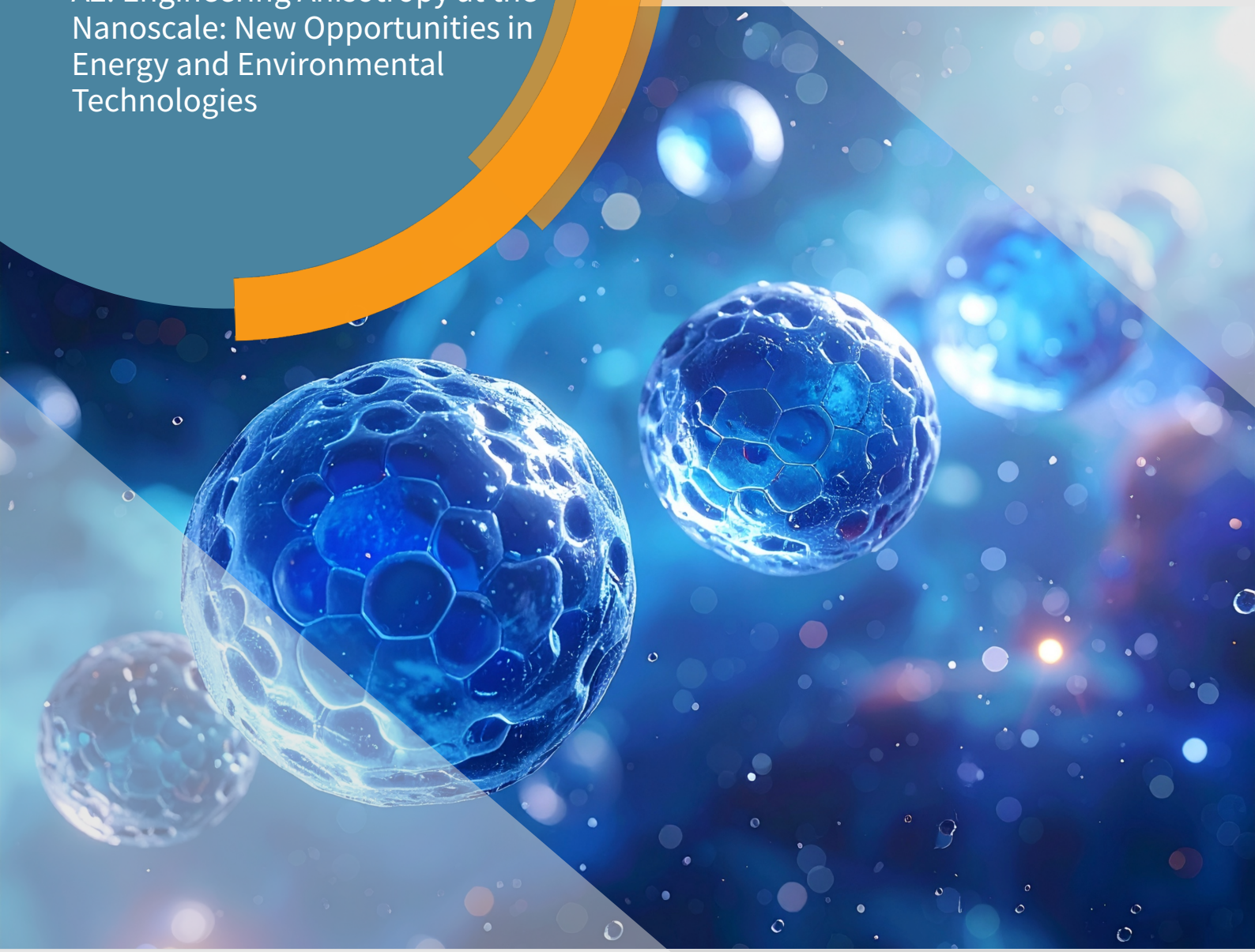
HIGHLIGHTS

A1. Solar-Driven Nanomaterials: Designing Functional Particles for Photocatalysis, Solar Desalination, and Advanced Photoprotection

A2. Engineering Anisotropy at the Nanoscale: New Opportunities in Energy and Environmental Technologies

18.11.2026

Save the Date for The Forge 2027 Conference!



Newsletter 12 (PCIG N12)

Welcome to the twelfth edition of our newsletter!

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RSC INTEREST GROUP
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CHARACTERISATION

Newsletter 12 (PCIG N12) - 18.11.2026

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 twelfth edition (November 2026 – March 2027), focuses on the following topics:

A. Research Highlights by **Federal University of Espirito Santo (Brazil)** on **'**Solar-Driven Nanomaterials: Designing Functional Particles for Photocatalysis, Solar Desalination, and Advanced Photoprotection' and by **Jain University (India)** on **'**Engineering Anisotropy at the Nanoscale: New Opportunities in Energy and Environmental Technologies'.

B. Get to know: inspiring stories by Akshaya K. Samal and George R. S. Andrade.

C. Update corner: 'Summer Science Exhibition' outreach event at the Royal Society in London. Upcoming events in the UK, Ireland and worldwide.

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, 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. Solar-Driven Nanomaterials: Designing Functional Particles for Photocatalysis, Solar Desalination, and Advanced Photoprotection

Written by Dr. George R. S. Andrade, editorially coordinated by Stefanos Mourdikoudis

Introduction

Sunlight is the most abundant clean and renewable energy source on our planet. However, fully harvesting its potential, or mitigating its harmful effects, requires precise control of matter at the nanoscale. Nanostructure engineering plays a pivotal role in capturing, converting, and managing solar radiation, transforming light into efficient solutions for environmental and human health challenges.

In this research highlight, we demonstrate how simple and/or classic analytical tools, such as UV-Vis absorption spectroscopy, X-ray diffraction (XRD), electron microscopy (SEM/TEM), and photoluminescence (PL), provide fundamental insights into structural, morphological, and optical characteristics. These accessible characterization methods enable the rational design and synthesis of functional particles across three solar-driven applications: (i) interfacial water desalination, (ii) photocatalytic degradation of organic pollutants, and (iii) broad-spectrum photoprotection. These technologies require overcoming persistent material challenges, such as high photogenerated charge recombination rates, restricted UV-only light absorption, poor photostability, and excessive thermal loss [1-5]. Overcoming these limitations relies on establishing precise structure-property-function relationships. By directly correlating parameters such as crystallite size, surface morphology, optical bandgap, and interfacial charge transfer with macro-level performance, classic analytical tools provide the foundational framework needed to engineer high-efficiency solar materials.

Case Study 1. Interfacial Solar Steam Generation for producing clean water

Freshwater scarcity remains a major global challenge, as conventional desalination relies heavily on fossil fuels or grid electricity. Solar-driven evaporation provides a clean, off-grid alternative by using sunlight to drive water phase transitions. Interfacial Solar Steam Generation (ISSG) has emerged as an efficient, low-cost strategy for seawater desalination and wastewater treatment. Unlike traditional volumetric heating, which suffers from severe thermal losses by heating the bulk water, ISSG confines heat conversion strictly to the air-water interface, minimizing thermal dissipation and maximizing vapor generation efficiency. To achieve this localized heat generation, functional photothermal materials are engineered to harvest broad-spectrum solar light and efficiently convert absorbed photons into localized thermal energy right at the evaporation surface. However, constructing photothermal evaporators that simultaneously possess high light absorption, rapid water transport, low thermal conductivity, and long-term chemical durability remains a core material challenge. To address this, we developed a green and low-cost photothermal composite by combining the hierarchical porous framework of carbonized loofah (*Luffa cylindrica*, CL) with *in situ* formed Cu_2O nanoparticles.[1]

In this system, X-ray Diffraction (XRD) served as an essential analytical tool to confirm the chemical identity, phase purity, and crystallite scale of the photo-active component. Because Cu_2O can easily oxidize to CuO or reduce to metallic Cu during thermal processing, XRD was required to record phase-specific Bragg reflections (specifically the (111) and (200) planes of cubic Cu_2O) using a standard laboratory X-ray diffractometer equipped with a Cu Kα radiation source (λ = 1.5418 Å). Beyond phase identification, peak broadening analysis via Scherrer's equation enabled the estimation of an average crystallite size of 21 nm anchored onto the graphitized carbon scaffold (Fig. 1A). Scanning electron microscopy (SEM) revealed that the natural vascular and porous fibrous network of the loofah scaffold was fully preserved after carbonization, with fiber surfaces uniformly coated by the Cu_2O aggregates (Fig. 1B).

While supporting metal oxides on carbonaceous substrates is widespread, the uniqueness of this architecture lies in the *in situ* growth and uniform intercalation of Cu_2O within the intact 3D vascular microchannels of the natural loofah scaffold, creating an interconnected porous matrix that maximizes light trapping and capillary water transport without clogging the fluid pathways. Hydration and surface charge measurements verified a high water uptake capacity exceeding 400% and a point of zero charge (PZC) of 2.4, ensuring continuous capillary water feeding to the evaporation front.

The photothermal performance of the composite was studied under natural sunlight. The surface temperature of the CL-Cu_2O composite rapidly approached 80 °C (Fig. 1C), reflecting its strong solar absorption and photothermal response. In outdoor interfacial evaporation experiments conducted at an average irradiance of 550 $W \cdot m^{-2}$, the evaporator achieved evaporation rates of 0.71-0.87 $kg \cdot m^{-2} \cdot h^{-1}$, corresponding to solar-to-thermal conversion efficiencies of 75-99% (Fig. 1D). When integrated into a prototype solar still using real seawater, the composite increased the overall efficiency by 53.8% and a 63.6% gain in water productivity relative to the control system (without the composite) at approximately 550 $W \cdot m^{-2}$, while under an irradiance of approximately 740 $W \cdot m^{-2}$, the improvements reached 141.7% and 157.1%, respectively. The resulting distilled water exhibited a purity of 99.9%, with pH, conductivity, and chloride concentration substantially lower than those of the original seawater. ICP-MS analysis further showed an exhibiting negligible copper leaching (0.002 ppm) across multiple operational cycles.

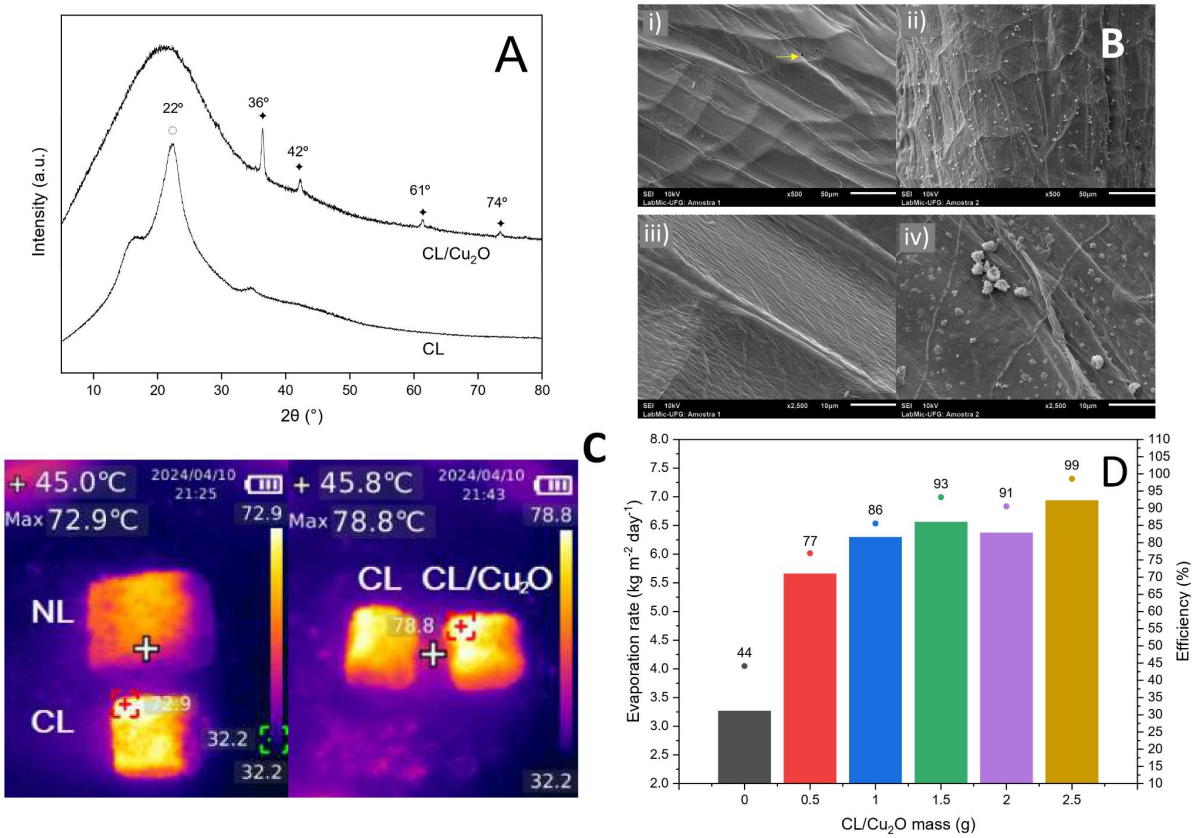


Figure 1. (A) XRD patterns of CL and CL/Cu_2O; (B) SEM images of CL (i) and iii)) and CL/Cu_2O (ii) and iv)); (C) Thermographic images of NL, CL and CL/Cu_2O; (D) water evaporation rate and % solar-to-thermal conversion efficiency using different amounts of CL/Cu_2O (Reproduced with permission from J. Alloy. Compd. 1030, 2025, 180883).

Case Study 2. Solar Photocatalysis with Plasmonic Heterostructures

Heterogeneous photocatalysis driven by solar radiation represents a promising approach for the degradation of organic pollutants in aqueous effluents. Zinc oxide (ZnO) is widely recognized as an efficient semiconductor due to its high electron mobility and low cost; however, its wide bandgap (~3.2 eV) limits light absorption to the ultraviolet spectrum, while rapid electron-hole (e^-/h^+) recombination hampers overall photocatalytic efficiency. To overcome these limitations, we developed hybrid plasmonic heterostructures by coupling star-shaped ZnO nanostructures with noble metal nanoparticles, specifically silver (Ag) and gold (Au).

The synthesis and interfacial properties of these metal-semiconductor composites were thoroughly characterized using classic analytical methods. XRD and TEM characterization confirmed the preservation of the hexagonal wurtzite phase of the star-shaped ZnO aggregates, as well as the uniform deposition of Ag nanoparticles[2] (23.0 to 43.6 nm) and Au nanoparticles[3] (5.8 to 9.0 nm) onto the semiconductor surface (Fig. 2A). To probe optical harvesting and charge-carrier dynamics, UV-Vis Diffuse Reflectance Spectroscopy (DRS) and Photoluminescence (PL) Spectroscopy were employed as indispensable optical tools. Steady-state UV-Vis spectroscopy, measured using a standard benchtop spectrophotometer equipped with an integrating sphere, revealed intense Localized Surface Plasmon

Resonance (LSPR) bands in the visible range for the gold-functionalized hybrids (532 to 542 nm) (Fig. 2B). Concurrently, PL spectrofluorometry monitored radiative recombination processes; significant quenching of the intrinsic ZnO emission upon noble metal deposition directly evidenced efficient interfacial charge transfer and Schottky barrier formation that trap photogenerated electrons and suppress e^-/h^+ recombination.

Photocatalytic evaluations under UV-A and natural sunlight revealed the benefits of metal-semiconductor coupling through different mechanisms. Under UV-A irradiation, ZnO/Ag showed enhanced photocatalytic activity, whereas ZnO/Au extended the photoresponse into the visible region through plasmon-mediated processes. For the degradation of methylene blue under UV-A light, the ZnO/Ag hybrid achieved a 70% degradation rate within 60 minutes, compared to only 25% for pure ZnO. Under natural sunlight, the ZnO/Au system reached 65% decolorization over the same duration, driven by the injection of plasmon-generated electrons into the conduction band of ZnO (Fig. 2C). Additionally, the ZnO/Au hybrid displayed sonocatalytic activity in the dark under ultrasonic irradiation (35 kHz), attaining 32% decolorization via cavitation and sonoluminescence phenomena. Beyond its photocatalytic capability, silver incorporation substantially enhanced the antibacterial activity against *S. aureus* and *P. aeruginosa*, with the MIC (Minimum Inhibitory Concentration) decreasing from 250 µg mL^{-1} for ZnO to 15.63 µg mL^{-1} for the Ag-containing hybrid.

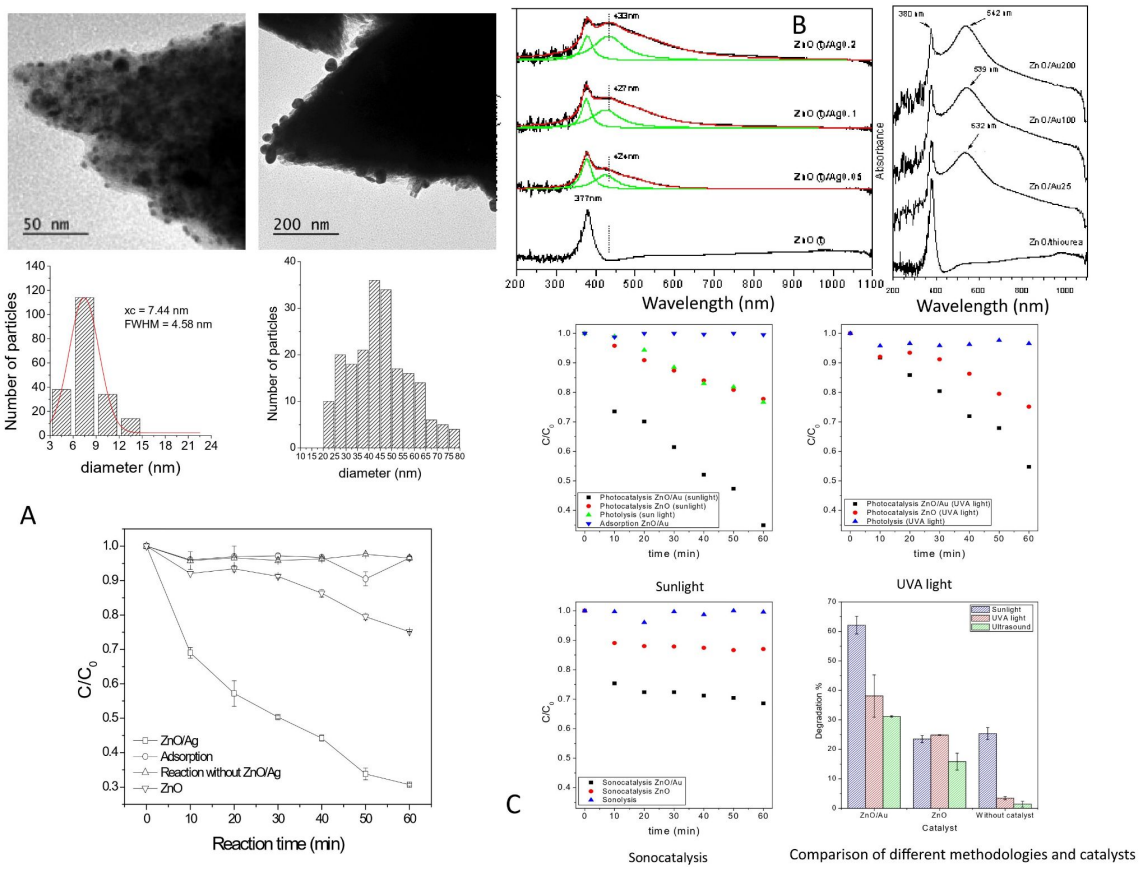


Figure 2. (A) TEM images and histograms (left: ZnO/Au, right: ZnO/Ag); (B) UV-vis-NIR diffuse reflectance spectra; (C) Temporal changes on the UV-vis absorbance spectrum of an aqueous methylene blue solution in the presence of pure ZnO, ZnO/Ag and ZnO/Au in different conditions (Reprinted with permission from Appl. Surf. Sci. 399, 2017, 573 & J. Alloy. Compd. 710, 2017, 557).

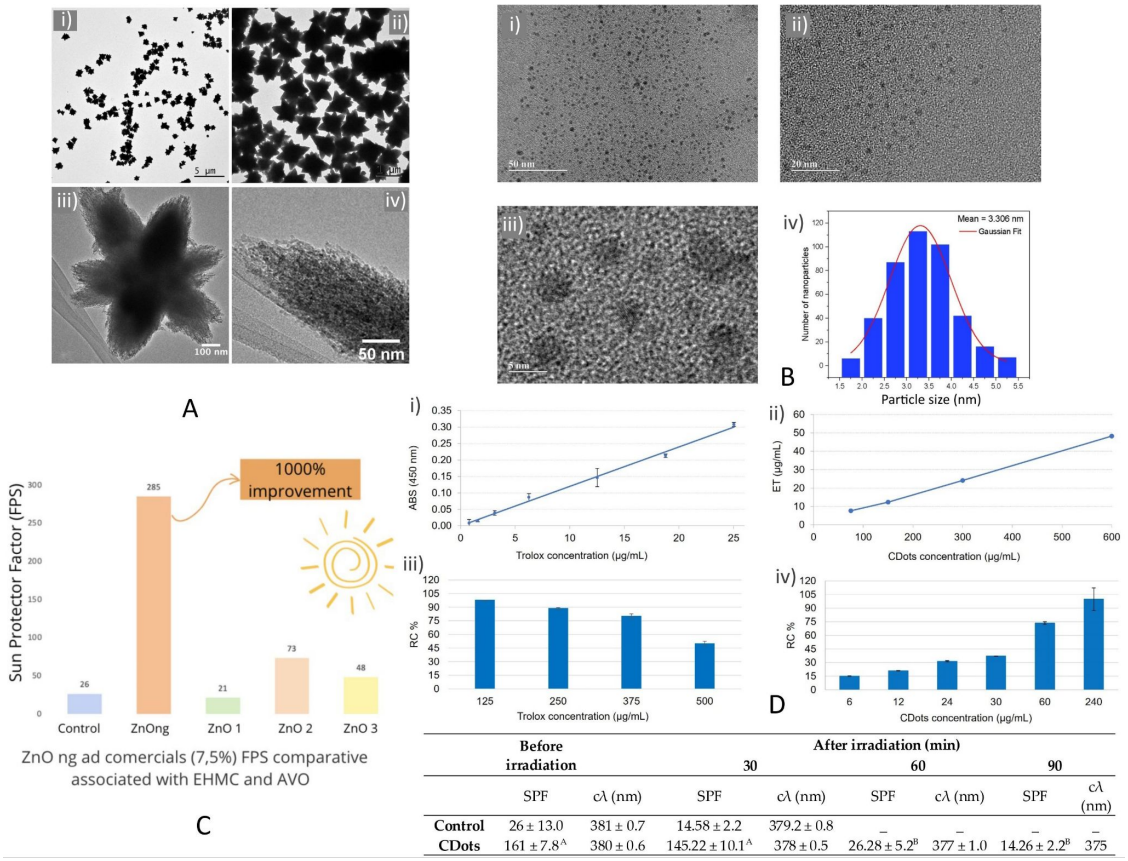
Case Study 3. Shielding from the Sun

While solar energy can be harvested for water purification and photocatalysis, exposure to ultraviolet (UV) radiation poses significant risks to human health, driving the need for highly efficient, broad-spectrum, and photo-stable photoprotective formulations. Conventional organic UV filters often suffer from photo-degradation under prolonged sunlight, whereas traditional inorganic filters like bulk ZnO can cause undesirable skin whitening or exhibit limited absorption efficiency. To overcome these challenges, we explored two innovative strategies leveraging advanced particle engineering and agricultural waste upcycling: star-shaped ZnO nanoaggregates (ZnOng) and coffee leaf-derived Carbon Dots (CDots).

The structural and functional characteristics of both nanomaterials were comprehensively validated using fundamental analytical techniques. For the inorganic approach, star-shaped ZnOng was synthesized via a green aqueous precipitation route. XRD measurements confirmed a highly crystalline hexagonal wurtzite structure (crystallite size of 26.8 nm), while TEM imaging revealed three-dimensional, star-shaped particles (1.1 µm) arising from the aggregation of sub-micron crystallites (Fig. 3A).[4] UV-Vis spectroscopy demonstrated intense UV absorption centered at 379.2 nm with an

optical bandgap of 3.12 eV. For the organic-derived approach, CDots were synthesized via a one-pot microwave-assisted method using *Coffea canephora* leaf extracts.[5] TEM analysis revealed the presence of quasi-spherical nanoparticles with a mean diameter of 3.3 nm (Fig. 3B), an optical bandgap of 4.16 eV, and strong UV absorption (200-400 nm) accompanied by blue photoluminescence (emission peak at 445 nm). Fourier-transform infrared spectroscopy (FTIR) further identified hydrophilic carboxyl, hydroxyl, and amine functional groups on the CDot surface.

When incorporated into topical sunscreen formulations, both nanomaterials exhibited remarkable booster effects and enhanced photostability. The addition of 7.5% ZnOng into a cosmetic base containing organic filters (EHMC and BMDBM) resulted in an approximately 990% increase in *in vitro* Sun Protection Factor (SPF), elevating the value from 26 to 285 (Fig. 3C), while significantly outperforming commercial ZnO benchmarks and reducing skin opaqueness (whitening effect). Similarly, incorporating 4.5% upcycled CDots into the organic filter formulation boosted the in vitro SPF from 26±13 to 161±8 while maintaining a broad-spectrum critical wavelength (l_c = 380 nm) (Fig. 3D). Beyond UV attenuation, electron paramagnetic resonance (EPR) and CUPRAC assays revealed exceptional antioxidant properties for CDots (99.9% DPPH radical scavenging at 240 $\mu g \cdot mL^{-1}$), alongside excellent hemocompatibility (7.8% hemolysis at 1000 $\mu g \cdot mL^{-1}$; see Fig. 3D). Crucially, both systems demonstrated superior photostability under simulated solar irradiation: the CDot-boosted sunscreen lost only 10% of its SPF after 30 minutes (compared to a 44% loss in the CDot-free control), and the ZnOng formulation sustained broad-spectrum efficacy (SPF > 15 (l_c > 370 nm) after 90 minutes of intense UV exposure.



	Before irradiation		After irradiation (min) 30		60		90	
	SPF	cλ (nm)	SPF	cλ (nm)	SPF	cλ (nm)	SPF	cλ (nm)
Control	26 ± 13.0	381 ± 0.7	14.58 ± 2.2	379.2 ± 0.8	–	–	–	–
CDots	161 ± 7.8[A]	380 ± 0.6	145.22 ± 10.1[A]	378 ± 0.5	26.28 ± 5.2[B]	377 ± 1.0	14.26 ± 2.2[B]	375

Figure 3. (A) TEM images of the as-prepared ZnOng at different magnifications; (B) TEM images at different magnification (i-iii) and size distribution of the as-prepared Cdots (iv); (C) Sun Protection Factor (SPF) of star-shaped ZnO and commercial ZnO associated with EHMC and AVO; and (D) Antioxidant activity and in vitro sun protection factor (SPF) and critical wavelength (cλ) values of C-dots samples (Reprinted with permission from Photobiol. B, 258, 2024, 113068 & Photochem, 5, 2025, 32).

Conclusion and Characterization Perspectives

In conclusion, the rational design of functional particles driven by solar energy demonstrates how tailored nanostructures can address critical challenges in clean water generation, environmental remediation, and broad-spectrum photoprotection. Whether harvesting solar radiation for photothermal evaporation, capturing visible light through plasmonic heterostructures, or scattering and absorbing UV rays in photostable sunscreens, controlling particle size, morphology, and surface chemistry is essential for optimizing performance. A central takeaway from these studies is the indispensability of accessible and classic characterization techniques. UV-Vis spectroscopy, XRD, SEM/TEM, PL and FTIR measurements provided fundamental insights that enabled precise structure-property-function correlations. Moving forward, combining green synthesis routes with robust characterization frameworks will remain pivotal in translating solar-driven nanomaterials from fundamental research into scalable, sustainable commercial technologies.

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Learn more:

Interfacial Solar Steam Generation

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Solar Photocatalysis

- Ashina, C. et al., Review on Enhancing Solar Photocatalysis for Sustainable Degradation of Invisible Environmental Pollutants. Renewable and Sustainable Energy Reviews 214 (2025) 115490. https://doi.org/10.1016/j.rser.2025.115490
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Sunscreen and UV filters

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A2. Engineering Anisotropy at the Nanoscale: New Opportunities in Energy and Environmental Technologies

Written by Akshaya K. Samal, editorially coordinated by Stefanos Mourdikoudis

> **The central idea:** At the nanoscale, shape is more than geometry. By controlling dimensions, exposed facets, composition and interfaces, we can regulate charge transport, catalytic activity, surface reactivity and pollutant interactions

Anisotropic nanomaterials such as metal oxides, chalcogenides, hydroxides, and hybrid composites incorporating metallic nanoparticles, carbon-based, or cellulose nanocrystals, exhibit direction-dependent properties arising from their structural and compositional characteristics. **Anisotropic Nanomaterial Group** investigates these anisotropic functional nanomaterials by tuning the structure and properties. Our research also focuses on the synthesis of anisotropic nanostructures with

controlled morphology, exposed crystallographic facets, and well-defined interfaces to understand how these features influence surface reactivity, electronic structure, and material performance. We apply these principles to develop nanomaterials for catalysis, energy conversion, and environmental remediation, with particular emphasis on establishing structure-property relationships that guide the design of efficient and stable functional materials. It focuses on designing and developing anisotropic nanomaterials by tuning shape, chemical composition, crystallographic facets, and interfacial interactions to build structure-activity relationships and improve performance. By integrating controlled synthesis with surface engineering and theoretical insights, we investigate a diverse range of materials, including one-dimensional tellurium-based architectures for energy storage and electrocatalytic water splitting, facet-engineered noble-metal nanostructures for catalytic applications, plasmonic platforms for surface-enhanced Raman spectroscopy (SERS), and functional materials for the detection and adsorption of environmental pollutants, including per- and polyfluoroalkyl substances (PFAS).

The main question is: how can we regulate a material's behavior by designing its structure?

01 | BUILDING ANISOTROPIC ARCHITECTURES FOR ENERGY STORAGE

From tellurium nanotubes to hierarchical electrode architectures

Growing demand for efficient and sustainable energy-storage technologies has intensified the search for electrode materials with improved charge transport, accessible redox-active sites, and structural stability. Anisotropic nanomaterials offer an effective design strategy because their morphology, exposed surfaces, and interfaces can influence ion transport and electron transfer within an electrode. Our research explores this concept through the development of transition-metal-modified tellurium (Te) nanostructures, using Te nanotubes (NTs) as an anisotropic support. As illustrated in Fig. 1 (b-h), field-emission scanning electron microscopy (FESEM) and transmission electron microscopy (TEM) reveal the nanotubular morphology of Te and CoTe-based structures, while elemental mapping provides evidence of the spatial distribution of constituent elements. The schematic in Fig. 1(e) illustrates the formation of Co-Fe-decorated Te NTs, highlighting the strategy of integrating additional transition-metal species with the one-dimensional (1D) Te framework. This combination of morphology and composition offers opportunities to introduce additional redox-active sites and modify interfacial charge-transfer behavior *(ACS Appl. Nano Mater.* 2021*, 4,* 9008*; Mater. Today Chem.* 2022*, 24,* 100871*).*

The electrochemical behavior of these materials is further illustrated by the cyclic voltammetry (CV) and galvanostatic charge-discharge (GCD) curves of CoTe-1, CoTe-2, and CoTe-3 presented in Fig. 1(j,k), respectively. These measurements provide a basis for comparing their redox characteristics, charge-storage behavior, and discharge response. The observed electrochemical differences can be associated with variations in composition and electrode structure, although their specific origins require correlation with the corresponding structural and electrochemical data. The 1D nanotubular architecture may facilitate electron transport along the framework, while accessible surfaces promote electrolyte contact and ion transport. Meanwhile, transition-metal incorporation can contribute

additional redox-active sites, with the overall performance depending on composition, interfacial quality, and structural stability. We extended the design of Te-based electrode materials towards hierarchical architectures for flexible and solid-state energy storage. Fig. 1(a) schematically illustrates the synthesis of CoMgTe microtubes (MTs) directly on nickel foam (NF), demonstrating an approach for integrating the active material with a conductive current collector. Fig. 1(i) presents the assembly of an all-solid-state supercapacitor (ASSSC) based on Te NTs@CoMgTe, illustrating the translation of the hierarchical electrode architecture into a device configuration. In addition, NiLaTe microfibers (MFs) represent another approach to constructing multicomponent Te-based structures. Together, these examples highlight the potential of combining different structural length scales, transition-metal species, and conductive substrates to improve electrolyte accessibility, interfacial charge transfer, and electrode integration *(J. Energy Storage* 2023*, 65,* 107286*; ChemSusChem* 2024*, 17,* e202301009*).* Overall, Fig. 1 summarizes the relationship between nanostructure design, compositional modification, electrode architecture, and electrochemical characterization, establishing a framework for developing Te-based materials for advanced energy-storage applications.

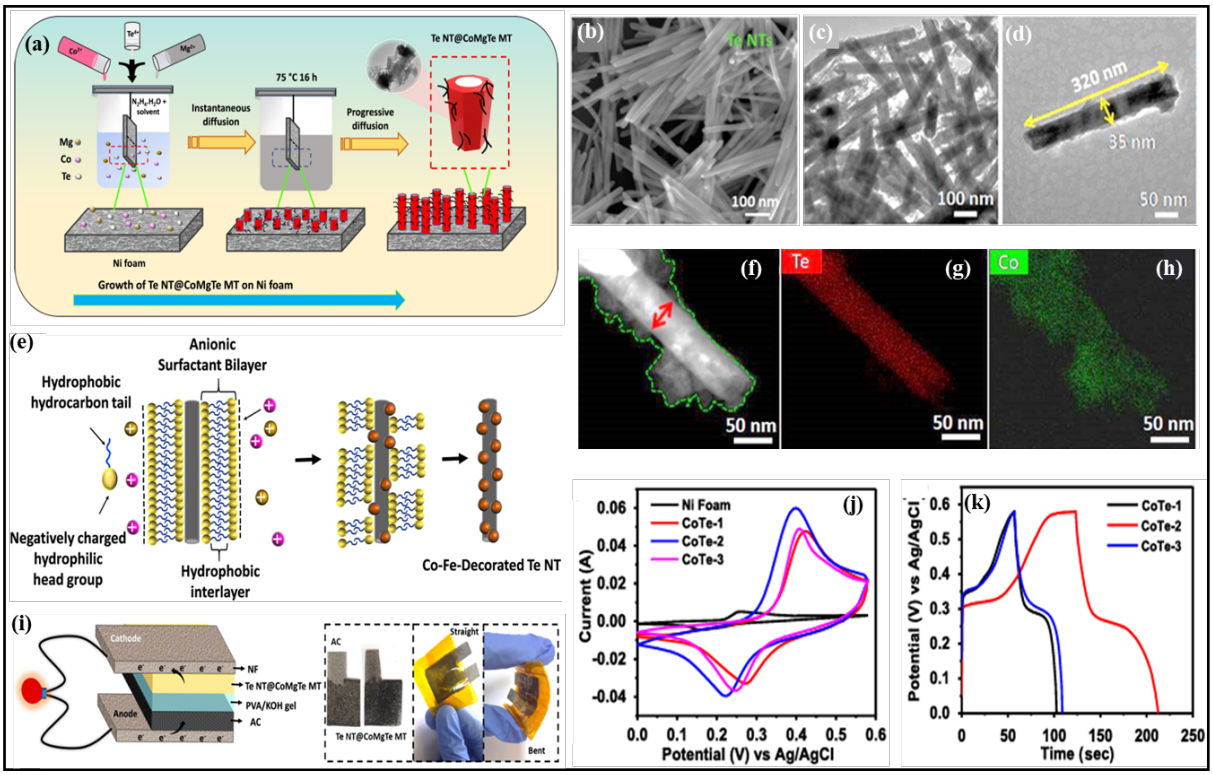

Figure 1. (a) Schematic illustration for the synthesis of CoMgTe MTs on NF (J. Energy Storage 2023, 65, 107286), (b) FESEM images of Te NTs, (c,d) TEM images of CoTe NTs and mapping, (e) Schematic representation of the formation of Co-Fe decorated Te NTs, and (f-h) TEM images of CoTe NTs and mapping (ACS Appl. Nano Mater. 2021, 4, 9008-9021), (i) Illustration of an ASSSC assembly of Te NT@CoMgTe (ChemSusChem 2024, 17, e202301009), (j) CV curves, and (k) GCD curves of CoTe-1, CoTe-2 and CoTe-3 (Mater. Today Chem. 2022, 24, 100871). Reprinted with permission where relevant from original publishers.

02 | TURNING STRUCTURAL ANISOTROPY INTO CATALYTIC ACTIVITY

Composition, morphology, interfaces and electronic structure for water splitting

Electrocatalyst design requires simultaneous control of composition, morphology, electronic structure and interfacial interactions because each influences active-site accessibility and charge-transfer kinetics. Our water-splitting studies therefore use anisotropy as a framework for connecting these variables.

Composition controls electronic structure

The anisotropic structural characteristics of one-dimensional (1D) architectures facilitate directional electron transport, efficient charge-transfer kinetics, and improved accessibility of electroactive sites, making them attractive platforms for advanced electrochemical conversion applications. In this context, a wet-chemical synthetic strategy was employed to construct 1D $Co_xNi_{1-x}Te$ MFs on NF, exploiting tellurium as a self-sacrificing template to promote anisotropic growth. Modification of the Co/Ni ratio regulated the MF architecture with higher Ni content leading to shorter and fragmented structures whereas the optimized $Co_{0.75}Ni_{0.25}Te$ composition formed a dense interconnected network as shown in FESEM images of Fig. 2 (a,b) facilitating electron transport and electrolyte-ion diffusion. Electrochemical studies revealed that this structurally optimized electrode exhibited an OER overpotential of 289 mV at 10 mA cm^{-2} with a Tafel slope of 102 mV dec^{-1} [Fig. 2 (c,d)]. DFT calculations linked the optimized composition to an increased density of states near the Fermi level and favourable OH coverage, establishing a direct link between composition, electronic structure, and electrocatalytic behavior. *(Mater. Today Chem.* 2023*, 30,* 101557*)*.

Bimetallic design and structural transformation

The strategy was extended to the binder-free, in-situ growth of NiLaTe nanofibers on NF utilizing tellurium as template to direct anisotropic growth. Systematic variation of the Ni/La ratio regulated the nanofiber morphology with the optimized 1:1 composition producing elongated, uniform nanofibers (~30 ± 5 µm in length), unlike the fragmented and agglomerated structures observed in Ni-rich compositions. The resulting bimetallic NiLaTe architecture with a width of approximately 423 nm consisted of mixed hexagonal NiTe and cubic La_2Te_3 phases enabling synergistic electronic interactions among Ni, La, and Te as shown in TEM images of Fig. 2 (e,f). This structural and electronic coupling combined with improved active-site accessibility and charge-transfer characteristics enhanced the bifunctional electrocatalytic performance compared with the individual NiTe and La_2Te_3 counterparts, requiring overpotentials of 332 mV for OER and 186 mV for HER, respectively as shown in LSV polarization curves of Fig. 2 (g,h). These findings highlight how the combined regulation of composition, phase structure, and anisotropic morphology can tailor electronic properties and surface reactivity to enhance electrocatalytic behaviour *(ACS Appl. Nano Mater.* 2025*, 8,* 14328-14341*)*. Another study demonstrated that controlled Ni incorporation into a lanthanum-based system induced significant structural and morphological transformations converting thick, broad petals into thinner, sharper architectures. Subsequent calcination promoted the phase transformation from $La(OH)CO_3$ to $La_2O(CO_3)_2$ while introducing surface porosity in $Ni_{0.028}La_2O(CO_3)_2$ MFs as shown in schematic

illustration of Fig. 2 (i). The optimized Ni incorporation further contributed to lattice stabilization and electronic structure modulation whereas the porous architecture increased active-site accessibility thereby enhancing activity. This study highlights how dopant-induced structural transformations and porosity engineering can regulate charge transport, surface reactivity, and electrocatalytic behavior. *(ACS Appl. Mater. Interfaces* 2025*, 17,* 35505-35521*)*

Interface design strategy

Beyond composition and morphology, we studied catalyst-support interactions using octahedral Pd_3Cu_7 alloy nanostructures supported on hexagonal boron nitride nanosheets (Pd_3Cu_7@hBNNs), graphene oxide nanosheets (GONs), and zirconium oxide (ZrO_2). The integration of Pd_3Cu_7 with different supports enabled the modulation of interfacial interactions, electrochemically active surface area, and charge-transfer characteristics thereby influencing electrocatalytic behaviour as shown in schematic of Fig. 2 (j). Among these architectures, Pd_3Cu_7@hBNNs showed enhanced HER performance, requiring an overpotential of 64 mV at 10 mA cm^{-2}. DFT simulations achieved a nearly thermoneutral hydrogen adsorption free energy (ΔG_{H^*}=−0.01 eV) for Pd_3Cu_7@hBNNs, providing a mechanistic link between interfacial interactions and enhanced HER kinetics. These findings demonstrate that rational catalyst-support interface engineering provides an effective strategy to regulate surface reactivity, charge-transfer processes, and reaction energetics thereby enhancing electrocatalytic performance. *(ACS Appl. Mater. Interfaces* 2023*, 15,* 50134-50147*)* Overall, these studies demonstrate that electrocatalytic behaviour can be adjusted via composition, morphological control, structural transformation, and catalyst-support interactions.

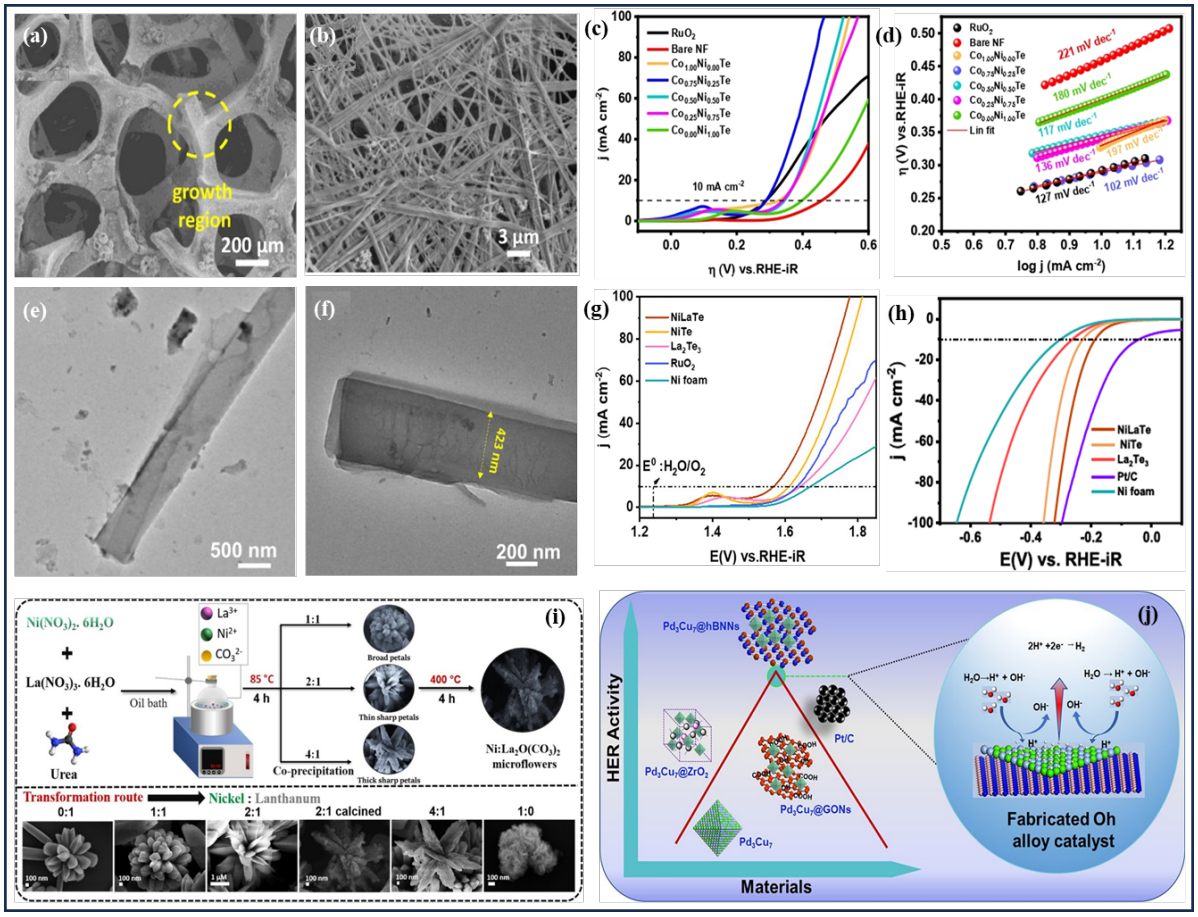

Figure 2. (a, b) FESEM images of $Co_{0.75}Ni_{0.25}Te$ MFs grown on NF, and (c, d) LSV curves and corresponding Tafel plots (Mater. Today Chem. 2023, 30, 101557), (e, f) TEM images of NiLaTe NF, and (g, h) OER, HER (ACS Appl. Nano Mater. 2025, 8, 14328-14341), (i) Schematic for the synthesis route and FESEM image of $NiLa_2O(CO_3)_2$ MFs (ACS Appl. Mater. Interfaces. 2025, 17, 35505-35521) and (j) Graphical representation of Pd_3Cu_7 alloy for HER (ACS Appl. Mater. Interfaces 2023, 15, 50134-50147). Reproduced with permission where relevant from original publishers.

03 | HARNESSING STRUCTURAL ANISOTROPY FOR SENSING AND DETECTION

Facet-selective interactions for emerging contaminants, pesticides, and catalysis

Facet-dependent reactivity

Sensing and detection performance can be tailored by optimizing crystal size, dimensionality, morphology, exposed crystallographic facets, and defect or strain distributions. Furthermore, the incorporation of coordinatively unsaturated sites, localized charge accumulation, and strengthened interfacial bonding can modulate surface reactivity, catalytic activity, and plasmon-enhanced detection sensitivity. To evaluate the selectivity of the facets towards the pollutant removal, Pd nanostructures such as Pd nanocubes (100), octahedra (111), and cuboctahedra (100/111) were developed via a seed mediated method as shown in FESEM images [Fig. 3 (a-d)]. The 4-nitroaniline reduction activity was observed in the order: nanocubes (100) > octahedra (111) > cuboctahedra (100/111). The observed higher reactivity of (100) facets can be attributed to differences in surface

atomic configuration and coordination environments. Pd nanocubes (100) with low relative activation energy of 0.9686 as compared to other nanostructures promoted the reduction of nitroaromatic compounds to amines using BH_4^- as the electron donor suggesting that exposed (100) facets provide more favorable active sites (*Appl. Surf. Sci.* 2021, 570, 150775).

Anisotropic plasmonic structures for pesticide detection

Advances in nanotechnology have enabled the design of increasingly complex architectures from diverse nanoscale building blocks. However, understanding and controlling both the formation or assembly kinetics remains a significant challenge as structural complexity grows. Introducing well-defined facets and shapes in anisotropic systems can direct interactions within nanostructures through favorable directional bonding, leading to a wide variety of assemblies. This principle is central to our recent work, where the plasmonic Au nanorods were used as a platform for the detection and degradation of the broad-spectrum insecticides such as malathion (MLT) and chlorpyrifos (CPF) up to 0.15 ppt within 2 minutes as displayed in Fig. 3 (e). Since, the sulfur terminated sites in these compounds induced self-assembly such as side-to-side and end-to-end assembly without an additional assembly agent as represented in schematic illustration of Fig. 3 (f) and inset TEM images *(Langmuir* 2020*, 36,* 7332-7344*).* The selectivity of the facets in SERS detection of thiram (TRM) was observed in another study of Ag nanocubes and nanowires upon the irradiation of 638 nm laser as displayed in Fig. 3 (g). The Ag nanocubes achieved an enhancement factor of 1.6×10^{-6} at 1 µM TRM and a detection limit of 10 fM, compared with 4.5×10^{-5} and 1 nM, respectively, for Ag nanowires *(Environ. Sci.: Nano* 2020*, 12,* 3999-4009*).* This superior enhancement achieved by using Ag NWs suggests that greater exposure of (100) facets and the associated electromagnetic hot spots make nanocrystal shape a functional variable rather than a simply morphological descriptor.

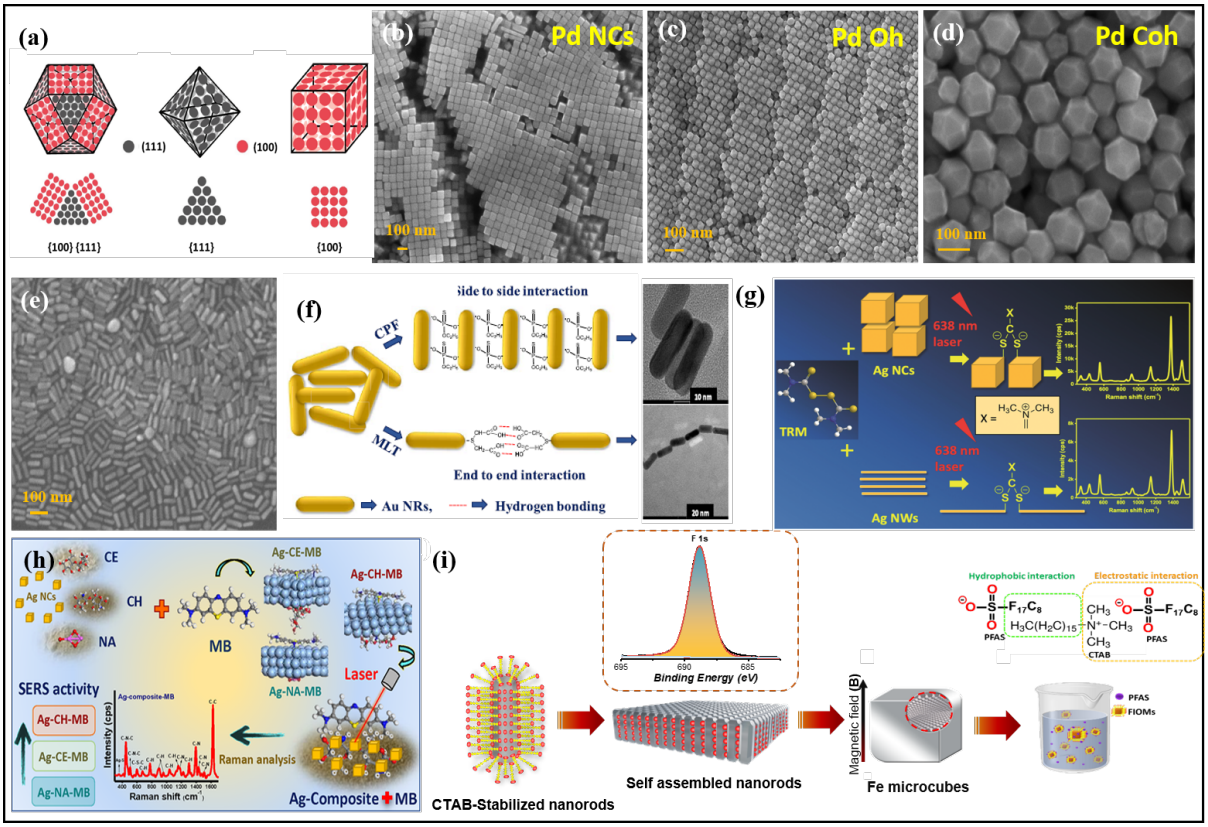

Figure 3. (a) Schematic representation (SR) of different planes and facets, (b-d) FESEM images of Pd NCs, Pd Oh, and Pd Coh, (Applied Surf. Sci. 2021, 570, 150775) (e) FESEM image of Au NRs (f) SR for the interaction of Au NRs with CPF and MLT, (Langmuir 2020, 36, 7332) (g) SR of plausible mechanism of interaction of TRM with Ag NCs and NWs, (Environ. Sci. Nano. 2020, 12, 3999-4009) (h) SR of detection of MB through SERS, (ACS Sustainable Chem. Eng. 2023, 11, 10605–10619) and (i) Schematic illustration for the mechanism involved in the formation of IOMCs. (Langmuir 2024, 40, 10184-10194). Reprinted with permission where relevant from original publishers.

Can support enhance the interaction/sensing enhancement?

The substrate selection influences the mechanical, electrical, and chemical characteristics of the functional sensing layer. Thus, to translate shape-controlled Ag nanocubes into practical sensing platforms, we integrated low concentrations of Ag nanocubes with cellulose (CE), chitosan (CH), and neutral alumina (NA). SERS analysis of the resultant Ag-CE, Ag-CH, and Ag-NA composites was performed with different analytes, such as 4-mercaptobenzoic acid (4-MBA), rhodamine 6G (R6G), and methylene blue (MB) as represented in Fig. 3 (h). The enhancement factors for MB were 1.2×10^6, 1.4×10^6, and 3.7×10^5 for the Ag-CE, Ag-CH, and Ag-NA composites, respectively; Ag-CH showed the highest sensitivity among the three composites and an exceptionally low detection limit of 100 pM. The superior sensing performance of Ag-CH was evidenced from DFT calculations, where Ag-CH revealed a stronger MB adsorption energy (-5.98 eV) compared to Ag-CE (-5.57 eV) and Ag-NA (-5.30 eV). Furthermore, the composites demonstrated efficient MB removal through a real-time filtration system, establishing their potential for integrated pollutant detection and environmental remediation. The enhanced removal is attributed to the chemical adsorption of methylene blue (MB) on Ag facets, which induces charge redistribution within the molecule and modifies the interfacial electronic structure.

Consequently, electron density accumulates around the sulfur and carbon atoms of the CS functional group and the adjacent Ag surface making it energetically favorable.(*ACS Sustainable Chem. Eng*. 2023, *11*, 10605-10619)

Facet engineering for PFAS detection and capture

Crystallographic facet engineering plays a crucial role in PFAS detection and capture by regulating surface reactivity and molecular adsorption. The facet-controlled Cu_2O nanostructures such as nanocubes (~450 nm) and octahedra (~650 nm) were developed via a simple one-pot method which demonstrated variable PFAS adsorption. Surface Cu^+ sites and the CTAB capping agent facilitate PFAS interactions through electrostatic and hydrophobic forces. Moreover, the octahedral Cu_2O (111) exhibited higher PFAS adsorption than nanocubes Cu_2O (100) owing to the selectivity of Cu-terminated (110) and (111) facets for PFAS sorption. Meanwhile, the comparatively lower reactivity of Cu-terminated (100) facets is attributed to higher energy barriers for surface interactions. *(J. Water Process Eng.* 2024*, 62,* 105390*)* In a similar study, the self-assembly of vertically oriented nanorods into thermodynamically stable α-Fe_2O_3 microcubes established a defined hierarchical structure, while CTAB-mediated surface stabilization and positive surface charge promoted PFAS adsorption as represented in Fig. 3 (i). Meanwhile, the magnetic properties of the Fe-based material enabled facile recovery after sorption. Thus, structural engineering provides a route to integrate enhanced adsorption with practical material recovery, highlighting how morphology, surface charge, and functional properties collectively govern PFAS-removal performance. *(Langmuir* 2024*, 40,* 10184-10194*)*

LOOKING AHEAD

Our work highlights that anisotropy extends beyond a morphological feature, serving as a key structural design parameter for regulating charge transport, active-site accessibility, intermediate adsorption, and pollutant interactions. Moving forward, our research aims to advance from empirical morphology control toward the rational design of crystal facets, interfaces, and dynamically evolving surfaces to establish well-defined structure-property-performance relationships. Particular emphasis will be placed on developing scalable synthetic strategies for non-noble metal-based electrocatalysts with precisely engineered heterostructures and active sites. By integrating templating approaches with *in situ* studies of chalcogenide reconstruction and exploring the role of external magnetic field effects on catalytic behaviour, we aim to establish clear structural relationships with the activity metrics. The ultimate goal is to translate these fundamental insights to enable the design of efficient, durable and practically viable catalysts for sustainable electrochemical energy conversion applications. Our research group is also actively working on a new framework to optimize and engineer 1D and 2D active materials to design more reliable and efficient energy storage devices.

MEET THE ANISOTROPIC RESEARCH GROUP



Group members (left to right): ***Monika K. Nagaraj (SRF), Dr. Tamizhselvi R (Postdoc.), Novuhulu Rhakho (SRF), Latha Lalam (Project Assistant), Prof. Akshaya K. Samal (Supervisor), Mahima Kaje (JRF), Tejaswini M (JRF), Dr. Arpitha S B (Postdoc.), and Ajith Samal (M.Sc).***

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Email: s.akshaya@jainuniversity.ac.in
Research areas: Shape-dependent nanostructures, electrocatalysis, facet engineering, electrochemical sensing and SERS.

CONNECT WITH THE GROUP

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.

B1. Get to know

Collected by Stefanos Mourdikoudis

Researcher profile of Prof. Akshaya K. Samal, CChem, FRSC



At the forefront of nanomaterials research, Dr. Akshaya K. Samal, CChem, FRSC, Professor at the Centre for Nano and Material Sciences (CNMS), JAIN (Deemed-to-be University), Bengaluru, leads the Anisotropic Research Group, where the controlled engineering of nanoscale structures forms the foundation of research spanning catalysis, energy storage and conversion, sensing, and environmental remediation. A basic tenet of nanoscience underpins his work: a material's shape, crystallographic facets, interfaces, and composition are not just structural characteristics but also key determinants of its physicochemical properties and functional performance.

Under the guidance of Professor T. Pradeep (Padma Shri), Prof. Samal earned his Ph.D. in Chemistry from the Indian Institute of Technology Madras in 2010. His doctoral studies concentrated on the synthesis, characterization, and properties of one-dimensional nanostructures. Then he completed postdoctoral studies with Prof. Luis M. Liz-Marzán at the University of Vigo, Spain, and Prof. Jean-Marie Basset at King Abdullah University of Science and Technology (KAUST), Saudi Arabia. This multidisciplinary research experience established his competence in controlled nanomaterial synthesis, interfacial chemistry, and the connection between nanoscale architecture and material function. In recognition of his scientific contributions, he was elected a Fellow of the Royal Society of Chemistry (FRSC) and Chartered Chemist (CChem).

The Anisotropic Research Group investigates how deliberate control over nanoscale geometry, exposed crystal facets, and interfacial architecture can translate into measurable improvements in material performance. Its research encompasses a diverse range of nanostructures, including nanocubes, nanorods, octahedra, nanotubes, and hierarchical architectures. The team aims to develop significant structure-property-activity correlations that facilitate the rational design of functional nanomaterials by combining controlled synthesis with advanced characterization and mechanistic studies.

Creating anisotropic electrocatalysts for water splitting and sustainable hydrogen production is a major research area. Facet engineering and compositional control tune surface reactivity, charge-transfer mechanisms, and adsorption of reaction intermediates. Complementary research investigates SERS, where tailored surfaces enable sensitive molecule detection, noble-metal nanostructures, and shape-dependent catalytic behavior. By examining how surface chemistry, morphology, and interfacial interactions can be used for contamination detection and remediation, the group's environmental research applies these concepts to newly emerging pollutants, such as pesticides and PFAS.

Dr. George Ricardo Santana Andrade



Hello! I am Ricardo, a Professor of Inorganic Chemistry at the Federal University of Espírito Santo (UFES) in southeastern Brazil. My academic path started with a degree in Chemistry and led to a Master's and Ph.D. in Materials Engineering at the Federal University of Sergipe (UFS). Knowing early on that I wanted to pursue a life in academia, I jumped into undergraduate research right in my first semester under the mentorship of Dr. Iara F. Gimenez. Beyond her exceptional technical and scientific guidance, Prof. Iara offered me something that profoundly shaped the rest of my career: freedom. I was given the autonomy to propose ideas, write project proposals, and test my hypotheses in a well-equipped laboratory. Responsibly giving wings to my imagination and scientific curiosity motivated me to remain happily engaged in the same research group all the way through my undergraduate, Master's, and doctoral studies.

When I landed a professorship at UFES - São Mateus campus, I felt a mix of pure excitement and a bit of hesitation. Leaving a large, fully equipped university for a growing campus in a smaller regional town was a big shift. My solution? Focus on research that genuinely brings me joy. Growing up in Aracaju, Sergipe, sunny days were a constant and, during a research stay abroad in my Ph.D., I realized just how much sunlight affects my energy, well-being, and scientific outlook! Today, one of my primary research lines focuses on developing solar-driven functional materials across three main areas:

i. Interfacial Solar Steam Generation and Desalination: Utilizing carbonized plant-based supports (such as loofah sponges, sugarcane bagasse, and coffee harvest residues) integrated with metal oxide nanoparticles (such as CuO, Cu_2O, SnO, and Mn_2O) for passive, highly efficient seawater purification.

ii. Plasmonic and Heterogeneous Photocatalysis: Engineering hybrid ZnO or CeO_2 nanostructures with controlled morphologies, functionalized with plasmonic nanoparticles for the degradation of organic pollutants in wastewater.

iii. Advanced Photoprotection: Formulating broad-spectrum sunscreens using additives such as ZnO and Carbon Dots synthesized via the upcycling of domestic and agricultural waste.

My main goal is that the impact of our research extends far beyond the walls of academia. Scientifically, we demonstrate how functional materials can be rationally designed through accessible synthetic routes and classic analytical characterizations. Environmentally, we champion the circular economy by converting waste into advanced technology and offering sustainable solutions for clean water production and environmental remediation. Socially, we bridge the gap between science and the community through environmental education initiatives, accessible science communication materials, and Junior Scientific Initiation projects that bring public high school students into the laboratory to experience the transformative power of research firsthand.

Ultimately, our journey shows that science can be driven by creativity, passion, and dedication, even in smaller institutions navigating infrastructure challenges. Throughout this path, local, national, and international scientific collaborations have proven essential in expanding our horizons and maximizing the reach of our discoveries. This brings me back to the ideas of freedom and happiness. Just as I was given a vote of confidence early in my training, I make it a priority to offer that same creative freedom to my undergrad students in the lab. I always start by asking them what topics they enjoy, what concepts they want to explore, and which real-world applications spark their curiosity, and we build our research projects together around our interests. Whenever we step into new territory, collaborators from diverse fields step in to support our studies and enrich the learning journey. When we create space for students to pitch their own ideas, embrace mistakes, test hypotheses, and think critically, they stay motivated and happy and the results are extraordinary.

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 - Royal Society Summer Science Exhibition 2026

Written by Liudmyla Storozhuk, editorially coordinated by Stefanos Mourdikoudis

From tiny particles to big possibilities

From 30 June to 5 July 2026, the Royal Society in London hosted the Summer Science Exhibition 2026, bringing cutting-edge research from across the UK to the public through interactive exhibits, demonstrations, talks and hands-on activities. The free exhibition featured 13 flagship exhibits, each showcasing a different area of science and research.

Our team at University College London was delighted to take part in this year's exhibition with our flagship exhibit, "**Nanomaterials: A Giant Leap for Healthcare**." The exhibition gave visitors an opportunity to discover how incredibly small materials can make a huge difference to healthcare, from earlier cancer diagnosis and medical imaging to new approaches to cancer treatment.

Through five interactive activities, visitors explored how nanoparticles are being developed and used to address some of the major challenges in modern medicine.

1. Spotting cancer earlier with lateral flow technology

One of the activities focused on lateral flow technology, a familiar technology used in COVID-19 tests and pregnancy tests. Our team demonstrated how the same basic principle could potentially be adapted to detect cancer at a much earlier stage.

Lateral flow tests rely on the optical properties of gold nanoparticles. However, detecting the very small amounts of cancer-related molecules present during the early stages of disease remains a challenge. At the exhibition, visitors discovered how simple chemistry can be used to concentrate gold nanoparticles at the test line, potentially making these tests more sensitive. Visitors could also play the interactive "Red Line" game to see for themselves how the process works.

2. Growing miniature tumours in the laboratory

The second activity introduced visitors to 3D tumour models, also known as tumouroids. These miniature, three-dimensional models are created in the laboratory using human cells and are designed to reproduce important features of real tumours.

Rather than relying solely on animal models when studying potential cancer treatments, researchers can use these living models to investigate how nanoparticle-based therapies interact with cancerous and healthy tissue. Visitors learned how these models are grown and how they could help researchers understand whether new treatments can target cancer cells while limiting damage to surrounding healthy tissue.

3. Making nanoparticles on the move

The third activity demonstrated a portable continuous flow reactor developed by our broader research team. Producing nanoparticles with the right size and properties requires careful control of mixing, temperature and reaction time. Continuous flow reactors provide a way of carrying out these processes rapidly and precisely, while also offering potential for larger-scale production.

The team's reactor was designed using computer modelling and manufactured using a 3D printer. During the exhibition, it was running live and producing iron oxide nanoparticles, giving visitors a behind-the-scenes look at how nanomaterials for healthcare applications can be manufactured.

4. Using magnets to heat cancer cells

Another highlight was magnetic hyperthermia, an emerging approach to cancer treatment that uses magnetic nanoparticles and an alternating magnetic field to generate heat. The heat can damage or kill cancer cells and could potentially be used alongside established treatments such as chemotherapy and radiotherapy.

The team has developed a new type of iron oxide nanoparticle known as an 'iron oxide nanoflower', named for its distinctive structure. The researchers have reported substantially higher heating efficiency compared with the iron oxide nanoparticles used in some clinical studies. Greater heating efficiency could potentially reduce the amount of material required to achieve a therapeutic effect, although further research and clinical evaluation are needed.

5. A glimpse into the origins of nanoscience

The fifth activity connected today's nanotechnology research with one of the earliest discoveries in the field. Visitors had the rare opportunity to see Michael Faraday's original gold colloid samples and notebook, kindly loaned by the Royal Institution, alongside his original peer-reviewed paper describing his experiments with gold.

Faraday discovered the gold colloids while experimenting with extremely thin sheets of gold. He noticed that a chemical liquid containing the tiny gold particles had developed a faint ruby colour. When he shone a beam of light through it, he observed a visible cone of scattered light produced by particles too small to be seen individually.

This phenomenon became known as the Faraday-Tyndall effect and helped lay some of the foundations for modern nanoscience. Remarkably, 14 bottles of Faraday's gold colloids held by the Royal Institution remain optically active more than 170 years after they were produced.

From a simple gold nanoparticle test to miniature tumours, 3D-printed reactors and magnetic cancer therapies, the exhibition showed how nanoscience is opening up new possibilities across healthcare.

For our team, the event was also an opportunity to bring cutting-edge research out of the laboratory and share it with the public - showing that when it comes to nanomaterials, small size can really make a giant difference. Throughout the exhibition, visitors could discover how nanoparticles are already

being used in healthcare and how researchers are developing new nanomaterials for future applications. One of the activities demonstrated how nanoparticles produce the characteristic coloured lines used in diagnostic tests such as lateral flow tests. Visitors could also explore a portable flow reactor and see how magnetic nanoparticles can be used in cancer research with an infrared camera.

A particularly exciting part of the exhibit was the opportunity to talk about magnetic nanoparticles and their potential in cancer treatment. We were able to explain how these tiny magnetic materials respond to an alternating magnetic field and generate heat, and how this principle is being investigated for magnetic hyperthermia.

The exhibition was also a great opportunity to speak directly with members of the public about our research. Questions came from visitors of all ages, from school students discovering nanotechnology for the first time to adults interested in how laboratory research can eventually translate into real healthcare applications.

Over the five-day public programme, the exhibition welcomed around 11,000 visitors. The final weekend, particularly Saturday 4 and Sunday 5 July, was exceptionally busy, with long queues forming outside the Royal Society as people came to explore the exhibits.

Being one of the 13 flagship exhibits was a fantastic opportunity to share our research beyond the laboratory and to show that, although nanoparticles are incredibly small, they can play a significant role in tackling some of the challenges facing healthcare.

It was a memorable week of science, conversations and new ideas - and a great reminder of the value of bringing research directly to the public.



The Royal Society building during the Summer Science Exhibition



Our research team participation at the Summer Science Exhibition of the Royal Society

SAVE THE DATE

RSC INTEREST GROUP
PARTICLE CHARACTERISATION

The Forge

The FORGE is RSC-PCIG's flagship conference, bringing together leading academics and industrial scientists working across particle science and nanotechnology.

University of Strathclyde,
Technology and Innovation Centre
99 George St, Glasgow G1 1RD

7-9 April 2027

Themes

- Pharmaceutical Science and Technology
- Advanced Materials
- AI and Machine learning for Particle Characterisation

» Special SAXS Workshop & RTP Forum «

Confirmed Speakers:

-Prof. Hermann Nirschl
Karlsruhe In. of Tech., Germany
-Prof. Yvonne Perrie
Uni. of Strathclyde, UK
-Prof. Ross Forgan
Uni. of Glasgow, UK
-Prof. Maria del Puerto-Morales
ICMM-CSIC, Madrid, Spain
-Dr Dogan Ozkaya
Johnson Matthey, UK
-Dr Karine Philippot
LCC-CNRS, Toulouse, France

For more info or to express your interest and submit an abstract: ***pcig.rsc@pcig.co.uk***

DECHEMA
Gesellschaft für Chemische Technik und Biotechnologie e.V.

IChemE
Institution of Chemical Engineers

C2. Upcoming events of interest

UK-based events

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

1. Materials for Quantum Technology 2026, 25/11/2026, London

https://iop.eventsair.com/mforqt

2. In situ Workshop 2026, 24-25 November 2026, Diamond Light Source, Didcot

https://www.rms.org.uk/rms-event-calendar/2026-events/in-situ-workshop-2026/programme.html

3. Faraday Community poster symposium, 30/11/2026, London

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

4. Inaugural Conference on Advanced Combustion, Safety and Diagnostics for Rapid Energy Transition, 3-4 December 2026, London

https://www.iop.org/physics-community/iop-conferences

5. Society of Electron Microscopy Technology (SEMT) meeting, 7/12/2026, London

https://www.eventbrite.co.uk/e/society-of-electron-microscope-technology-semt-meeting-tickets-2001563231506?aff=oddtdtcreator

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

https://ddl-conference.com/

7. Liquids and Complex Fluid Group Annual Research Meeting, 10/12/2026, London

https://iop.eventsair.com/lcfg2026/

8. Super Resolution in the North 2026, 11/12/2026, University of Sheffield

https://www.rms.org.uk/rms-event-calendar/2026-events/super-resolution-in-the-north-2026.html

9. Materials Chemistry poster symposium, 14/12/2026, London

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

10. 45th Solid State Chemistry Group Christmas Meeting (SSCG 2026), 15-17 December 2026, University of Oxford

https://sscg.uk/2026-sscg-christmas-meeting

11. Winter Magnetism School 2026, 17-18 December 2026, London

https://iop.eventsair.com/wm2026

12. UK Light Microscopy Facility Meeting, 7-8 January 2027, York

https://www.rms.org.uk/rms-event-calendar/2027-events/uk-light-microscopy-facility-meeting-2027.html

13. RSC Chemical Nanoscience and Nanotechnology Annual Symposium, 11-12 January 2027, London

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

14. Hands-on Training: Micro-Nano fabrication, 25-28 January 2027, Cork, Ireland

https://www.infrachip.eu/micro-nano-fabrication-hands-on-training/

15. Food Physics 2027 Conference, 27-28 January 2027, London

https://iop-food-physics-2027.eventsairsite.com/

16. Advanced School in Liquids and Complex Fluids: Solutions in the Spring, 1-4 March 2027, London

17. Liquids, Colloids and Complex Fluids Research Meeting, 4-5 March 2027, London

18. Microscopy of Semi-Conducting Materials 2027, 22-24 March 2027, Cambridge

https://www.rms.org.uk/rms-event-calendar/2027-events/msm2027.html

19. Physics of Life 2027, 22-25 March 2027, Edinburgh

https://iop-physics-of-life-2027.eventsairsite.com/

20. Magnetism 2027 conference, 1-2 April 2027, Leeds

https://iop-magnetism-2027.eventsairsite.com/

21. The 60th Annual International Meeting of the ESR Spectroscopy Group of the RSC, 5-8 April 2027, Manchester

https://www.esr-group.org/conferences/2027-conference-manchester/

22. Electrostatics 2027 conference, 5-9 April 2027, London

https://iop-electrostatics-2027.eventsairsite.com/

23. Electron Microscopy Spring School 2027, 5-9 April 2027, Leeds

https://www.rms.org.uk/rms-event-calendar/2027-events/electron-microscopy-spring-school-2027.html

24. **Forge 2027 (RSC-PCIG flagship biannual conference in particle science and technology),** 7-9 April 2027, University of Strathclyde, Glasgow

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

25. 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

26. Interdisciplinary Surface Science Conference 2027 (ISSC2027), 12-15 April 2027, Nottingham

27. Performing Quantitative Measurements in Surface Science – Memorial event for Prof. D. P. Woodruff F.R.S., 14 April 2027, Nottingham

28. 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

29. IOP Plasma Physics Conference, 19-22 April 2027, Cork

https://iop-plasma-2027.eventsairsite.com/

30. Photovoltaics Science, Applications and Technology Conference (PVSAT-2027), 21-23 April 2027, Birmingham

https://iop-pvsat2027.eventsairsite.com/

31. SynTech: Synthesis Technology Symposium 2027, 5-7 May 2027, Greenwich Campus, London

https://www.gre.ac.uk/events/current-events/faculty-of-engineering-and-science/syntech-synthesis-technology-symposium-2027

32. 18th European Conference on Liquid Crystals (ECLC 2027), 13-18 June 2027, University of Aberdeen

https://www.eclc2027.co.uk/

33. Indoor Photovoltaics Conference, 24-25 June 2027, Oxford

34. Microscience Microscopy Congress, 6-8 July 2027, Manchester

https://www.mmc-series.org.uk/

35. 18th International conference on materials chemistry (MC18), 12-15 July 2027, Cardiff

https://www.rsc.org/events/find-an-event/18th-international-conference-on-materials-chemistry-(mc18)

36. 22nd International conference on biological inorganic chemistry (ICBIC22), 25-30 July 2027, York

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

37. European Congress of Chemical Engineering and European Congress of Applied Biotechnology, 13-16 September 2027, Edinburgh

https://www.ecce-ecab2027.org/

38. Challenges and solutions for photothermal materials and applications Faraday Discussion, 15-17 September 2027, London

https://www.rsc.org/events/find-an-event/challenges-and-solutions-for-photothermal-materials-and-applications-faraday-discussion

39. 17th European Coatings Symposium, 21-23 September 2027, Cambridge

https://www.soci.org/events/colloid-and-surface-chemistry-group/2027/the-17th-european-coatings-symposium-ecs-2027

40. Photon 2028 Conference, 5-8 September 2028, Newcastle

Non – UK and Ireland events of possible interest

1. 5th Umicore Catalysis Symposium - Advancing Homogeneous Catalysis for Industrial Applications, 18 November 2026, Basel, Switzerland

https://pmc.umicore.com/en/events/ucs/ucs-2026/

2. International Conference 'Galician-Portuguese Chemistry Meeting', 18-20 November 2026, Pontevedra, Spain

https://www.encontrogalegoportugues.org/en

3. RSC First 2026: AI in Chemistry, 19-21 November 2026, Xiamen, China

https://rscfirst.org.cn/

4. 5th Annual Conference of the Austrian Society for Rheology, 20 November 2026, Graz, Austria

https://www.rheo.at/event/ogr-meeting-2026/

5. IPEC 2026, International Process Engineering Conference, 22-25 November 2026, Tashkent, Uzbekistan

https://aidic.it/ipec2026/

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

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

7. The Fourth Middle-Eastern Materials Science Conference, 24-26 November 2026, Abu Dhabi, UAE

https://publicprograms.nyuad.nyu.edu/en/the-institute/events/2026/november/the-fourth-middle-eastern-materials-science-conference-mems2026-.html

8. CellMAT 2026 (9th International Conference on Cellular Materials), 25-27 November 2026, Erlanger, Germany & Online

https://dgm.de/cellmat/2026/program/topics

9. 10th Scientific Meeting of PhD Students at the ICMAB, 25-27 November 2026, UAB Campus, Bellaterra, Barcelona area, Spain

https://jphd.icmab.es/registration.html

10. Ferrite Circulators: Theory, Design and Simulation (on-site training), 26/11/2026, Villach, Austria

https://fames-pilot-line.eu/ferrite-circulators-theory-design-and-simulation/

11. 2026 Fall Meeting & Exhibit, 29/11 - 04/12/2026, Boston, Massachusetts, USA

https://www.mrs.org/meetings-events/annual-meetings/2026-mrs-fall-meeting

12. NanoBio&Med2026 conference, 1-3 December 2026, Barcelona, Spain

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

13. Florence Electrolyser Conference, 2-3 December 2026, Florence, Italy

https://redcabin.de/summits/florence-electrolyser-conference/#key-topics

14. 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

15. 8th International Conference on Processing and Characterization of Materials (ICPCM 2026), 3-5 December 2026, NIT Rourkela, India

https://www.icpcmnitr.org/

16. Medical 3D-printing and innovative technologies, 4-5 December 2026, Linz, Austria

https://www.m3dit.org/

17. Women in Optics & Photonics in India Conference (WOPI 2026), 4-6 December 2026, Kochi, Kerala, India

https://wopindia.org/

18. 5th International Conference on Advances in Nanomaterials and Devices for Energy and Environment (CANDEE-2026), 5-6 December 2026, Gwalior, India

https://www.iiitm.ac.in/index.php/events/5th-international-conference-on-advances-in-nanomaterials-and-devices-for-energy-and-environment-candee-2025

19. 6th International Caparica Christmas Conference on Translational Chemistry (IC3TC), 6-10 December 2026, Caparica, Portugal

https://ic3tc2026.com

20. 'From Molecules to Functional Materials and Devices: Chemistry Beyond Equilibrium' international workshop associated with Kepler Prize 2026, 7-9 December 2026, Leipzig, Germany

https://www.eurasc.eu/kepler-prize-2026/

21. CRISTMas 2026 (Conference on Research and Innovations in Science and Technology of Materials), 7-11 December 2026, Paris, France

https://cristmas.org/

22. 1st Winter School on Electrochemical Impedance Spectroscopy (Theory and Practice), 7-11 December 2026, Rourkela, India

https://www.nitrkl.ac.in/docs/Workshop/MM/15082026123557447B.pdf

23. Second ICTS-ICTP Advanced School and Conference on Quantum Matter - Correlated Gapless Phases, 7-18 December 2026, Bengaluru, India

https://www.icts.res.in/program/qmcgp

24. Annual Danish Electrochemical Society Meeting, 8-9 December 2026, Lyngby, Denmark

https://electrochemistry.dk/annual-meeting-2026

25. 14th National Conference in Condensed Matter Physics and Applications (CMPA 2026), 8-9 December 2026, Manipal, India

https://conference.manipal.edu/cmpa/

26. 4th Southeast Asia Catalysis Conference (SACC), 10-11 December 2026, Singapore

https://www.sacc-2026.com

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

https://elecmol26.sciencesconf.org/

28. 3rd IWA Conference on Sustainable Natural and Engineered Water Systems Management, 14-17 December 2026, Agadir, Morocco

https://iwa-swsm2026.org/

29. International School on Altermagnets with Synchrotron X-ray and Electron spectroscopies, 14-18 December 2026, ALBA Synchrotron Light Source, Barcelona, Spain

https://indico.cells.es/event/1769/

30. Machine Learning for Microscopy Hackathon 3, 15-17 December 2026, Hybrid mode (multiple locations and online)

https://kaliningroup.github.io/mic_hackathon_3/

31. ELTE Theory Winter Workshop (focus on theoretical and computational condensed matter physics), 15-18 December 2026, Budapest, Hungary

https://trilmax.elte.hu/elte-theory-winter-workshop/

32. Second Workshop on Accelerating Scientific Discovery in Chemistry and Materials Science with HPC and AI, 16-19 December 2026, Bengaluru, India

https://sourceforge.net/p/mscc-applications-nsm/discussion/training/thread/e2b087b341/

33. The 18th MRAM Global Innovation Forum, 17/12/2026, San Francisco, USA

https://sites.google.com/view/mramforum?pli=1&authuser=0

34. National Young Scientist Conference (NYSC-2026), 17-18 December 2026, Ranchi, Jharkhand, India

https://www.nysc-yuvika-isro.in/

35. International Conference on Materials for Energy Environment and Healthcare, 18-20 December 2026, Calicut (Kozhikode), India

https://www.meehcon.com/

36. UNITES 2026 (Conference on Converging Frontiers in Science and Technology - Theme 2026: Physics at the Interfaces of Matter, Light and Life), 27-29 December 2026, Amaravati, India

https://www.srmap.edu.in/unites-2026/

37. International Conference on Key Advances in Materials Science (ICKAMS 2027), 6-8 January 2027, Thrissur, Kerala, India

https://campusround.com/2026/10/22/vimala-college-autonomous-thrissur/10168/

38. IEEE Advances in Magnetics 2027, 7-10 January 2027, Bardonecchia, Italy

https://www.aim2027.it/

39. ICSUMMIT 2027 (2nd International Conference on Sustainable Micro-Nano Materials & Innovative Technology), 8-9 January 2027, Parul University, Vadodara, Gujarat, India

https://www.puconferences.com/

40. 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

41. 7th FEMS Industry Symposium, 14/01/2027, Frankfurt airport, Germany

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

42. IPEROP27 (Perovskite and Organic Photovoltaics and Optoelectronics), 18-20 January 2027, Fukuoka, Japan

https://www.nanoge.org/IPEROP27/home

43. GEFES 2027 (XIV Meeting of the Condensed Matter Physics Division), 19-22 January 2027, Burgos, Spain

https://www2.ubu.es/gefes2027/en/home

44. Japan Spintronics School, 27-30 January 2027, Urabandai, Japan

https://sites.google.com/tohoku.ac.jp/japan-spintronics-school-2027/home

45. 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

46. European Winter School on Physical Organic Chemistry (Theme: catalysis - from small molecules to complex systems), 31/01 - 05/02/2027, Bressanone, Italy

https://www.ewispoc.com/

47. MATSUS Latam27 (Materials for Sustainable Development Conference), 1-3 February 2027, Cartagena, Colombia

https://www.nanoge.org/MATSUSLATAM27/home

48. 7th International Nanomotors Conference, 1-4 February 2027, Sandbjerg Gods, Denmark

https://event.au.dk/events/nanomotors

49. 29th Conference on Microscopy & Microanalysis, 1-4 February 2027, Sydney, Australia

https://www.acmm29.org/

50. 32nd annual Doctoral Students' Seminar on 'Inorganic non-metallic materials', 4-5 February 2027, Prague, Czech Republic

https://sil.vscht.cz/students/INM

51. European EELS & EFTEM School (laboratory workshop), 9-12 February 2027, Graz, Austria

https://www.eurmicsoc.org/european-eels-eftem-school-2/

52. STACK Winter Meeting (Structured Tandem Advancements in Perovskite Cells & Knowledge), 15-17 February 2027, Cerdanya, Spain

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

53. 1st Alpine School on Magnetics, 15-19 February 2027, St. Christoph am Arlberg, Austria

https://alpmag2027.eu/

54. 4th Transnational Round Table on Magnonics, High-Frequency Spintronics, and Ultrafast Magnetism, 15-19 February 2027, New Delhi, India

https://trtm2027.sciencesconf.org/

55. 3rd Edition of 'Catalysis and Reaction Engineering' conference, 22-24 February 2027, Los Angeles, California, USA

https://reactionengineerings.com/

56. 2nd Conference on Hydrogen in Materials Science and Engineering (H_2MSE), 23-25 February 2027, Kassel, Germany (hybrid format)

https://dgm.de/h2mse/2027/

57. 4th International Conference on Recent Composites and Advanced Materials, 24-26 February 2027, Chengalpattu District, Tamil Nadu, India

https://www.srmist.edu.in/events/icrcam-2027/

58. 2nd International Conference on Recent Advances in NanoScience and Technology (RAINSAT-2027), 1-5 March 2027, Chennai, India

https://rainsat-nano.com/

59. Magnettage 2027 (Magnet Days 2027 conference) (*some talks may be in German - contact the organizers*), 2-4 March 2027, Pforzheim University, Germany

https://dgm.de/magnettage/2027/en/

60. 22nd European Molecular Imaging Meeting (EMIM 2027), 9-12 March 2027, Bologna, Italy

https://e-smi.eu/meetings/emim/2027-bologna/

61. 7th International Conference on Light Materials (LightMAT 2027), 10-12 March 2027, Siegen, Germany and online

https://dgm.de/lightmat/2027/

62. 2nd TAD Conference (Transition Analytics for Decarbonization), 10-12 March 2027, Tokyo, Japan

https://tad-conference.sciencesconf.org/?lang=en

63. CO2 STO2027 (2nd International Workshop on CO2 storage and mineralization in construction materials), 16-17 March 2027, Paris / Marne-la-Vallee, France

https://www.fib-international.org/events/fib-supported-events/227-co2sto2027.html

64. ACS Spring 2027, 21-25 March 2027, New Orleans, Louisiana, USA

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

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

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

66. International Conference on Advanced Materials and Nanotechnology, 24-25 March 2027, Osaka, Japan

https://nanotechnology.noblescienceconsortium.com/

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

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

68. 8th International Conference on Environmental Applications of Advanced Oxidation Processes, 31/03 - 02/04/2027, Abu Dhabi, UAE

https://eaaop8.com/

69. MRS Spring Meeting & Exhibit, 5-9 April 2027, Seattle, Washington

https://www.mrs.org/meetings-events/annual-meetings/2027-mrs-spring-meeting-exhibit

70. Workshop on Active Matter: Motion, Mechanics, and Emergence, 5-9 April 2027, São Paulo, Brazil

https://www.ictp-saifr.org/wam2027

71. 30th Croatian Meeting of Chemists and Chemical Engineers, 6-9 April 2027, Milini, Croatia

https://www.rsc.org/events/find-an-event/30th-croatian-meeting-of-chemists-and-chemical-engineers

72. 10th International Slag Valorisation Symposium, 13-16 April 2027, Leuven, Belgium

https://slag-valorisation-symposium.eu/

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

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

74. 1st Iberian Corrosion Congress (IBERCorr'27), 26-28 April 2027, Lisbon, Portugal

https://www.lneg.pt/en/event/first-iberian-corrosion-congress-ibercorr27/

75. 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

76. Intermag 2027 (IEEE International Magnetics Conference), 10-14 May 2027, Jeju, Korea

https://www.intermag2027.org/html/

77. 1st International Conference on Materials for Security Technologies (MatSecure 2027), 11-12 May 2027, Dresden, Germany

https://dgm.de/matsecure/2027/

78. H2FUTURE27 (The Future of Hydrogen: Science Applications and Energy Transition), 11-13 May 2027, Ibiza, Spain

https://www.nanoge.org/H2Future27/home

79. 9th European Symposium on Biomaterials and Related Areas (BioMAT 2027), 12-13 May 2027, Jena, Germany

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

80. FlowMat 2027 workshop: Flow Synthesis of Multi-Scale Materials, 18-20 May 2027, Paris, France

https://flowmat2027.sciencesconf.org/

81. 8th Circular Materials Conference, 19-20 May 2027, Chalmers Conference Centre, Gothenburg, Sweden

https://circularmaterialsconference.se/

82. 10th International Workshop 'Characterization of Porous Materials: from Angstroms to Millimeters', 23-26 May 2027, Garmisch-Partenkirchen, Germany

https://cpm-workshop.org/

83. European Symposium on Chemical Reaction Engineering (ESCRE 2027), 23-26 May 2027, Milan, Italy

https://www.aidic.it/escre2027/index.php

84. HOPV (Hybrid & Organic Photovoltaics Conference), 2-4 June 2027, Valencia, Spain

https://www.nanoge.org/HOPV27/home

85. Sensing Technologies: Biosensors (Nature Conferences series), 2-4 June 2027, Coex, Seoul, South Korea

https://www.sensor-systems.conferences.nature.com/

86. International Conference on Chemistry and the Environment (ICCE 2027), 6-10 June 2027, Gdansk, Poland

https://icce2027.com/

87. FIB Symposium 2027 (ReThink Concrete: Structures for a Sustainable Transformation), 7-9 June 2027, Dresden, Germany

https://fib-2027.org/

88. 37th European Symposium on Computer Aided Process Engineering (ESCAPE 37), 7-10 June 2027, Trondheim, Norway

https://www.escape37.com/

89. HYPOTHESIS XXII (Hydrogen Power Theoretical & Engineering Solutions International Symposium), 8-12 June 2027, Eindhoven, Netherlands

90. 101st ACS Colloid & Surface Science Symposium 'ACS Colloids', 13-16 June 2027, University of Colorado Boulder, USA

https://colloids2027.org

91. 23rd International Conference on Magnetism (ICM), 14-18 June 2027, San Juan, Puerto Rico

https://icm2027.org/

92. XLI Biannual Reunion of the Royal Society of Chemistry of Spain (*meeting mostly for Spanish-speaking participants*), 14-18 June 2027, Murcia, Spain

https://rseq.org/xli-reunion-bienal-de-la-rseq/

93. 10th International Conference on Materials and Environmental Science, 17-20 June 2027, Saidia, Morocco

https://www.mocedes.org/icmes2027/

94. CLAY 2027, 20-26 June 2027, Madrid, Spain

https://clay.aipea.org

95. RawMat2027 (the 3rd International Conference on Raw Materials and Circular Economy), 28-30 June 2027, Athens, Greece

https://rawmat2027.ntua.gr/1st_announcement/

96. Sfμ2027: 20th symposia of the French Microscopy Society 2027, 28/06 - 02/07/2027, Grenoble, France

https://sfmu2027.sciencesconf.org/

97. 4th Advances in Separation Science Workshop, 29-30 June 2027, Gembloux, Belgium

https://www.advsepsci.uliege.be/cms/c_20669650/en/advsepsci

98. 18th International Conference on Chemical and Process Engineering, 4-7 July 2027, Turin, Italy

https://www.aidic.it/icheap18/

99. 6th International Conference on Aerogels, 5-7 July 2027, La Coruna, Spain

https://aerogelslab.egd.gal/

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

https://epf2027.org/

101. 21st International Meeting on Chemical Sensors (IMCS 2027), 11-14 July 2027, Montréal, Canada

https://imcs2027.com/

102. 2nd American Conference on Inorganic Nanoscience, 11-15 July 2027, Mount Snow Resort, West Dover, Vermont, USA

https://acin.inorganicnano.org/

103. 3rd Global summit on Materials Science and Nanotechnology, 16-17 July 2027, Hamburg, Germany

https://materialsscience.researchconnects.org/

104. Materials Today Conference, 18-22 July 2027, Montpellier, France

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

105. 2nd Global Conference on Graphene, 2D & Advanced Materials, 20-21 July 2027, Paris, France

https://graphene.intelliglobalconferences.com/

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

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

107. ACS Fall 2027, 22-26 August 2027, San Diego, California, USA

https://phys-acs.org/event/acs-fall-2027/

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

https://www.jems2027.eu

109. 6th European Conference on Physical Chemistry (connected with EuChemS), 29/08 - 03/09/2027, Thessaloniki, Greece

https://www.euchems.eu/events/6th-european-conference-on-physical-chemistry/

110. 8th EuChemS Inorganic Chemistry Conference, 5-9 September 2027, Barcelona, Spain

https://www.eicc8.com/

111. ESOMAT 2027 (14th European Symposium on Martensitic Transformations), 6-10 September 2027, Bochum, Germany

https://dgm.de/esomat/2027/

112. SuMAT 2027 (1st Sustainable Materials Summit), 8-10 September 2027, Dusseldorf, Germany

https://dgm.de/sumat/2027/

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

https://euromat2027.com/

114. 16th World Titanium Conference, 12-17 September 2027, Berlin, Germany & online

https://titanium2027.com/

115. 8th International Mass Spectrometry School, 19-24 September 2027, Alghero, Italy

https://www.euchems.eu/events/8th-international-mass-spectrometry-school/

116. The 6th International Conference on Nanomaterials, 20-22 September 2027, online

https://sciforum.net/event/IOCN2027

117. Materialographie 2027 (*mostly for German speakers - topic: material microstructure: analysis and characterisation*), 22-24 September 2027, Chemnitz, Germany

https://dgm.de/met/2027/

118. 7th International Conference on Hybrid Materials and Structures (Hybrid 2027), 29-30 September 2027, Bremen, Germany & online

http://dgm.de/hybrid/2027/

119. 4th International Conference on Energy, Environment & Digital Transition, 5-8 October 2027, Favignana, Italy

https://www.aidic.it/e2dt2027/

120. EuroChemBio 2027 - a new European home for chemical biology, 5-10 October 2027, Milan, Italy

https://www.euchems.eu/events/eurochembio-2027/

121. Future Materials 2027 (8th International Conference on Materials Science & Nanotechnology), 18-20 October 2027, Budapest, Hungary

https://materialsconference.yuktan.com/

122. Artificial Intelligence for Advanced Materials conference (AI4AM 2027), 19-22 October 2027, San Sebastian, Spain

https://ai4am.net/2027/index.php

123. 31st International CBMS Conference on Miniaturized systems for chemistry and life sciences (µTAS 2027), 5-9 December 2027, Pasadena, California, USA

https://microtas2027.org/

124. 20th International Symposium on Hyphenated Techniques in Chromatography and Separation Technology (HTC-20), 8-11 February 2028, Leuven, Belgium

125. 77th Lindau Nobel Laureate Meeting (Physics), 25-30 June 2028, Lindau, Lake Constance, Germany

https://www.lindau-nobel.org/future-meetings/

126. 78th Lindau Nobel Laureate Meeting (Chemistry), 24-29 June 2029, Lindau, Lake Constance, Germany

https://www.lindau-nobel.org/future-meetings/

127. 13th World Congress on Chemical Engineering, 26/8 - 31/8/2029, Prague, Czech Republic

https://wcce2029.com/

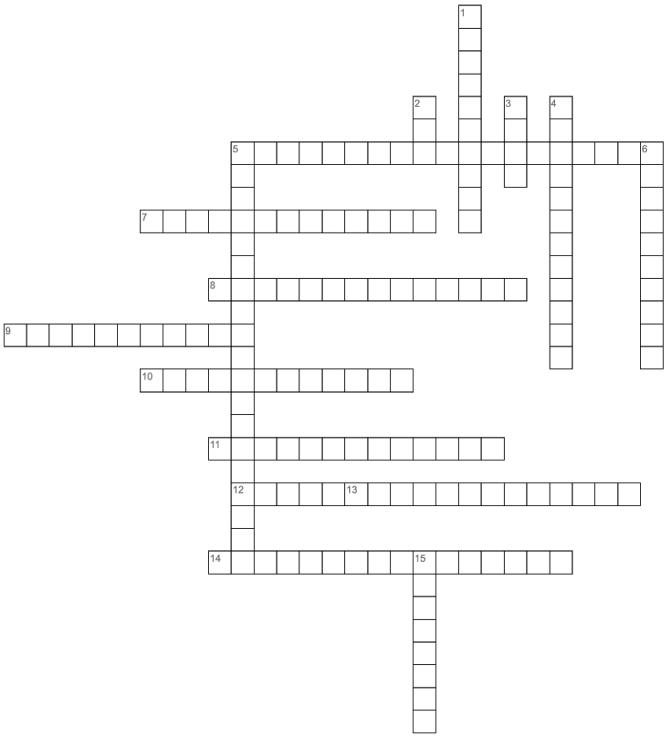
D. BRAIN TEASERS & SCIENCE

The answers will be published in the next newsletter.

By Anna Anandita

Note to readers: *please submit your answers to the brain teasers and we will announce the first five persons to get correct answers in our next newsletter! Send mail to:* ***Particlenewsletter@gmail.com***

THE PARTICLE PUZZLE LAB



Across

5 A measure of the total external area available at the surface of a powder, commonly reported per unit mass.

7 The three-dimensional arrangement of atoms responsible for characteristic diffraction patterns.

8 The random thermal movement that becomes increasingly important as particle size decreases.

9 Peaks produced when X-rays interact with ordered atomic planes.

10 The characteristic length scale obtained by analysing the two-dimensional image of a particle.

11 The electrokinetic potential commonly used as an indicator of colloidal stability.

12 A signal generated when an electron beam interacts with a sample and used to reveal surface morphology.

14 The size a particle appears to have while diffusing through a liquid, rather than its dry geometric diameter.

Down

1 The angular dependence of scattered light used to infer particle-size information.

2 Fluctuations in scattered light caused by particles undergoing thermal motion; analyzed to obtain a hydrodynamic size.

3 The width of a particle-size distribution, often expressed using D10, D50 and D90.

4 The ability of a material to absorb or scatter light at characteristic wavelengths, providing chemical information.

5 The ratio of scattered-light intensity to incident-light intensity

6 Gas molecules accumulating on a particle surface; the basis of many surface-area measurements.

13 A distribution parameter representing the diameter below which 50% of the measured particle population lies, depending on the distribution basis.

15 A particle's movement in an electric field, from which electrokinetic information can be obtained.

PARTICLE QUEST

Level - Medium

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

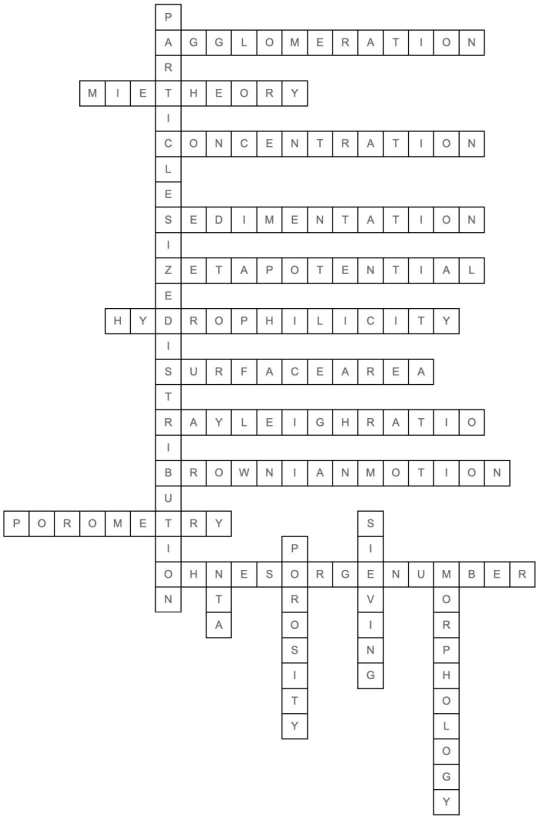
S D N W Z E T A P O T E N T I A L H V
I D W O Y P O R O S I M E T R Y H T U
S U U E I R P T I A E Z U I F E I T D
Y H X G G T T R D O G D T A M R Y T T
L I V O V Y C E A T N K L E N I Y W H
A I R P M B K A M O Z J D S B B X W E
N N S E L E C T R O P H O R E S I S R
A O G I U N T A R F T X I Y Z T J U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

LASERDIFFRACTION
SEM
RAMAN
POROSIMETRY
IMAGEANALYSIS
ZETAPOTENTIAL
DLS
TEM
XRD
SEDIMENTATION
FLOWCYTOMETRY
THERMOGRAVIMETRY
NTA
AFM
BET
ELECTROPHORESIS
GASADSORPTION
MICROSCOPY

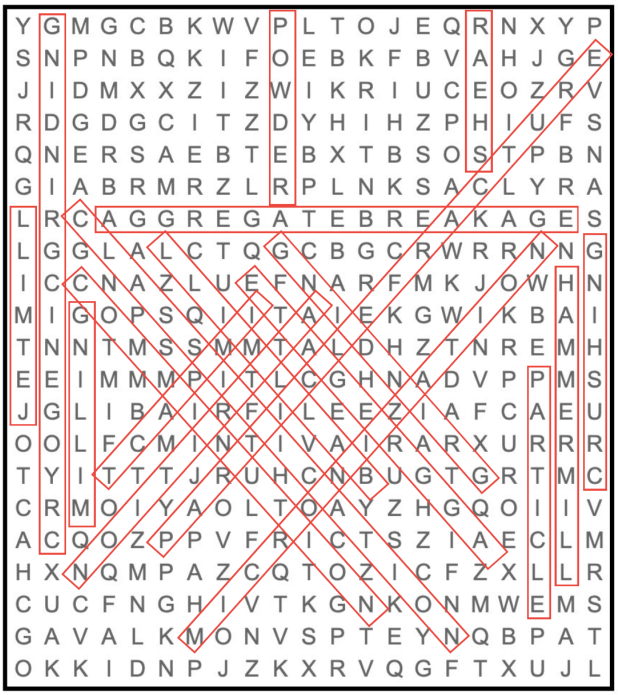
Email us your answers at our email ID. The first 5 correct answers would be announced in the next newsletter.

Answers for previous brain teasers

The Particle Puzzle Lab



Particle Quest



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.