BNN

ISSUE 03/2026

QUARTERLY

Digital Magazine for Developments in Sustainable Technology

FOCUS TOPIC:

Resilient Realities: Adaptive Learning and Innovation in the Advanced Materials Ecosystem

Impressum:

Owner and publisher:
BioNanoNet Forschungsgesellschaft mbH
Kaiser-Josef-Platz 9, 8010 Graz, Austria
UID: ATU 63046279, FN 285326 y

Graphic Design & Layout: Jenny Zeevi

Cover: © JOANNEUM RESEARCH /Bergmann

INNOVATION IS THE KEY.

SUSTAINABILITY LEADS THE WAY.

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Editorial

The developments during the first three quarters of 2026 brought evidence that changes are needed. On a personal level, on a company level, on a regional/national level, and on a global level. Each of these changes makes a difference. Global issues cannot be solved by one single person – however, each of us can contribute to solving them.

Let me address two aspects in this letter: relationships and communication.

Relationships are all about dealing with personalities. Needless to say that human beings are not uniform – we have a huge spectrum of differences; some call this diversity, while others speak about characteristics. The key element is that in our daily lives, we interact with each other; hence, we have relationships that can be extremely nice but also challenging. My pledge is that it is the responsibility of each of us to maintain relationships in a positive manner.

We have to be open to comments that point to potential for improvement and to getting better, while respecting others as well.

Communication is the tool for maintaining relationships. The quality depends on the honesty of the content and the way it is communicated. By learning languages and getting to know a multitude of cultures, we build communication skills – verbal and non-verbal – that enable us to take action and change things together, because we can do this organized in groups, teams, and communities.

In our daily business life at BNN, we create and maintain relationships, we use communication as a tool, and we put a lot of effort into "*being the glue*" of the ecosystem. Although we are a small organization, we are proud of our achievements over the past 20 years, and we know that we have been able to contribute to a "better together" in our region, nationally, and internationally.

Let me now invite you to join our autumn events (e.g., the BioNanoNet Annual Forum, including a b2match brokerage, and the FAME-Ecosys Event), to bring with you the motivation to create new or maintain existing relationships, and to apply your communication skills to make the world a little bit better.

See you soon,

Andreas & the BNN Team

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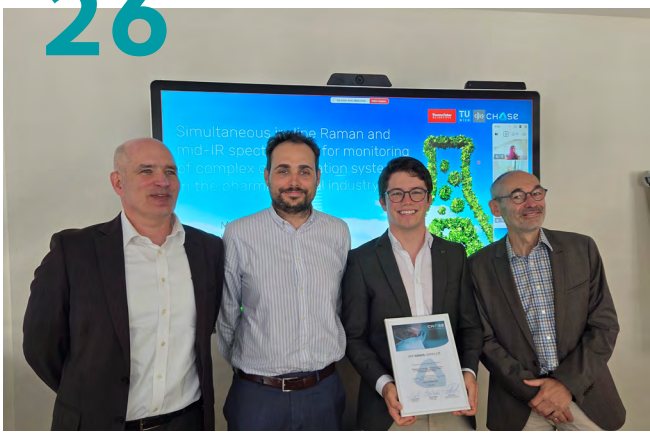

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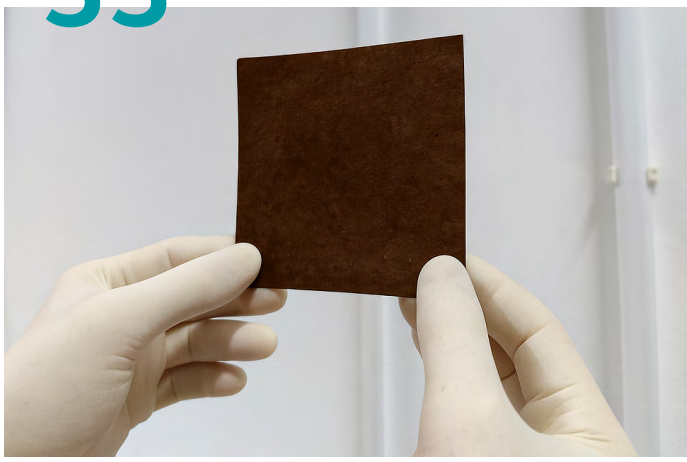

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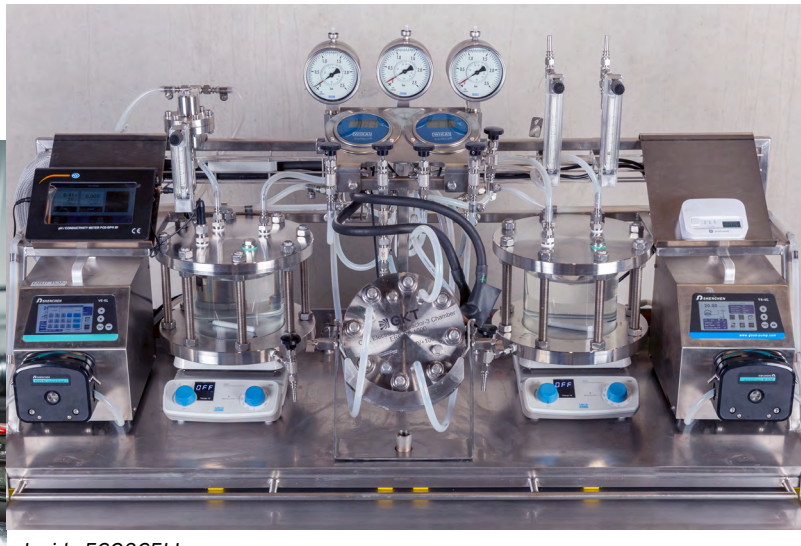
BNN News


BNN – who we are...
Non-profit RTO (research & technology organization)
Association >70 member organisations from 17 countries
3 technology platforms: sustainable chemistry, nanomedicine, microfluidics
The 5 core services of BNN
GO Compliant
Target Resilience and Regulatory Readiness
GO Sustainable
Develop safe & sustainable innovative materials, processes & products
GO Smarter
Unleash potential through optimal training

Engineering in action:
hands-on work with the ECO2CELL pilot system © GKT



Inside ECO2CELL:
the electrochemical cell at the core of CO_2 conversion © GKT

New BioNanoNet Association Member: GKT GmbH

GKT is a globally active Austrian system partner for thermal separation and environmental technologies. We deliver key industrial technologies ranging from falling–film, thin–film, and short–path processes to distillation and drying, as well as CO_2 valorization, waste heat recovery, and IIoT–enabled process optimization.

Our systems are used across a wide range of process industries where efficiency, decarbonization, and competitiveness are critical. These include pulp, (bio)refining, fiber, alternative fuels, (bio) plastics, food, feed, and chemical industries, as well as industrial wastewater treatment.

As part of the Dr. Aichhorn Group, we stand for stability and a long-term perspective. At our in-house technical center, we pilot and validate processes and scale them up to turnkey EPC plants.

Our approach: We Engineer Green Key Technologies. For industrial production processes, we implement solutions that reduce energy consumption, lower CO_2 emissions, and deliver measurable economic impact – proven worldwide through numerous successfully completed projects.

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Fostering Interdisciplinary Collaboration at JKU

First HoRI–BioNanoNet Workshop

At the time of the Johannes Kepler University's first anniversary as a member of the BioNanoNet association, the House of Research and Innovation (HoRI) organized its first joint workshop with BNN on July 8, 2026. During the event, nearly 30 JKU researchers gave short presentations on their research areas and were invited to engage in networking. The topics covered a broad spectrum, ranging from nanoelectronics and regenerative medicine to resilient value chains.

Prior to the workshop, the participants had been grouped into thematic clusters for the presentations in collaboration with the Research Support Office (RSO). This gave the workshop "a very strong thematic focus, enabling participants to easily orient themselves within the different subject areas," said BNN Managing Director Andreas Falk during the networking session following the event. This comprehensive overview of relevant research activities at JKU is a great asset for other network partners as well as the broader community in Europe.

Specifically, for the Horizon Europe 2027 calls, the presented competencies are highly relevant and can be found in JKU's member entry on the BNN website.

The organizing team of the workshop, Isabella Staska, Lena Bergmair, David Wineroither, Gentiana Pajaziti (all JKU) and Andreas Falk (BNN) are continuously supporting the scientists and researchers along the initiated paths toward projects and other ways of exploiting the research.

Presentations are available (for BioNanoNet members) here.

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FOCUS TOPIC
OF THIS ISSUE:

Resilient Realities: Adaptive Learning and Innovation in the Advanced Materials Ecosystem

Nanotubes Power PV PAINT's New Commercial Anti–Corrosion Coatings

- **PV PAINT has added nanotube–enhanced zinc–rich coatings to its commercial PERAPHENE™ portfolio, which are scheduled for market launch in Q3 2026.**
- **The new coatings are designed to provide long–term corrosion protection for critical assets operating in harsh industrial environments.**
- **Performance was validated through independent testing conducted in accordance with internationally recognized standards.**

PV PAINT, a member of Vietnam National Industry – Energy Group (PVN), has expanded its product range of high-performance protective coatings by introducing PERAPHENE™, including a special zinc-rich epoxy product enhanced with TUBALL™ single wall carbon nanotubes. Designed for assets operating in highly corrosive environments—including offshore oil and gas platforms, refineries, petrochemical plants, storage tanks, and marine infrastructure—the coatings deliver long-term corrosion protection and mechanical durability in compliance with independent corrosion and adhesion testing.

"Single wall carbon nanotubes (SWCNT) help overcome key performance limitations of conventional zinc-rich coatings, enabling a new generation of protective systems with the improved durability of corrosion protection, and the ease of application," said Mr. Vu Duy Cuong, General Director of PV PAINT. "By incorporating SWCNT, we developed coating systems that demonstrate excellent corrosion resistance, adhesion, and crack resistance during independent testing. The coatings successfully passed independent corrosion and adhesion tests, confirming compliance with internationally recognized industry standards for demanding operating environments. This product offers customers greater flexibility - for example, the ability to reduce coating thickness or zinc content while still ensuring long-term corrosion resistance. Following successful trials with Graphene-reinforced paint, we conducted independent tests on the application of SWCNTs in our products. The results demonstrated that each material offers distinct advantages. This has opened a new avenue of research aimed at diversifying the applications of SWCNTs and Graphene within the PERAPHENE™ range".

"We are pleased to continue strengthening our collaboration with PV PAINT and look forward to supporting the commercialization of these next-generation coating systems in Q3 2026. By helping customers extend asset service life, reduce maintenance costs and improve the sustainability of corrosion protection, this innovation will also reinforce Vietnam's position as an emerging regional leader in advanced protective coating technologies for the energy and petrochemical industries," said Loyes Zhi, General Manager of OCSiAl Greater China.

About PV PAINT

Petro Vietnam Paint Joint Stock Company (PV PAINT) was established in 2006 and is a member of Vietnam National Industry – Energy Group (PVN), one of the country's leading integrated energy companies. PV PAINT develops high-performance protective coatings for marine, offshore, industrial, and infrastructure applications, combining advanced technologies with sustainable manufacturing. The company's manufacturing facility has an annual production capacity of 10,000 tons. Through continuous innovation and product development, PV PAINT delivers durable coating solutions that meet the evolving needs of Vietnam's energy and industrial sectors.

About OCSiAl

Headquartered in Luxembourg, OCSiAl is the world's leading manufacturer of single wall carbon nanotubes. OCSiAl produces high-purity single wall carbon nanotubes on an industrial scale under the TUBALL™ brand name. The nanotubes have potential applications across up to 50% of global materials markets. OCSiAl has developed and is marketing globally a wide range of nanotube products for electrochemical power sources and various polymers. The company's sales force and distributor network cover more than 50 countries around the world.

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ECO2CELL: From captured CO_2 to new products

Carbon dioxide is commonly associated with industrial emissions. But carbon is also an essential building block for many everyday products. What if captured CO_2 could provide an alternative carbon source for producing some of these materials?

This is the idea behind ECO2CELL. GKT's patented electrochemical technology uses electricity and water to convert captured CO_2 into chemical products that can serve as building blocks for industrial value chains.

Rather than treating CO_2 exclusively as an emission, ECO2CELL creates a pathway for putting carbon back to productive use.

1. From CO_2 to chemical building blocks

At the heart of ECO2CELL is an electrochemical cell, where electrical energy drives the conversion of CO_2 into new chemical compounds.

The process operates at ambient temperature and atmospheric pressure without requiring an external hydrogen supply. By adjusting the catalyst, electrode materials, current density and electrolyte composition, different products can be generated, including synthesis gas, ethylene and formic acid.

This flexibility allows different conversion pathways to be investigated according to the intended application.

2. What can CO_2 become?

The products generated through CO_2 conversion can serve as starting points for further industrial processing.

Ethylene, for example, is an important building block for the chemical industry and can be further processed into polyethylene. Synthesis gas can serve as an intermediate for products such as methanol and synthetic fuels.

This illustrates ECO2CELL's role within a larger industrial process:

Captured CO_2 → electrochemical conversion → chemical building block → further processing → industrial product

ECO2CELL provides the conversion step that turns captured CO_2 into a usable input for downstream processes.

ECO2CELL in operation:
monitoring process performance during pilot testing © GKT

3. Developing the technology with ECO2CELL Core

Before a new CO_2 conversion process can move towards larger applications, it needs to be developed and tested under controlled conditions.

ECO2CELL Core provides a compact laboratory-scale platform for research institutions and industrial partners to investigate different catalysts, operating parameters and product configurations. Essential functions such as gas handling, heating, cooling and safety are integrated into the system.

With a stack cell featuring an active area of up to 900 cm^2, ECO2CELL Core provides an environment for developing and evaluating new CO_2 conversion concepts.

4. Taking the next step with ECO2CELL Cube

Once a process has been investigated at laboratory scale, ECO2CELL Cube provides the next step towards larger and more application-oriented testing.

The container-based pilot system combines electrochemical CO_2 conversion with the equipment required for operation, monitoring and analysis. Installed in two 20-foot containers and offering an electrolysis capacity of up to 15 kW, the Cube provides a platform for CCU and Power-to-X development.

Its containerized design allows the system to be transported and installed at industrial sites, enabling CO_2 conversion to be investigated closer to potential CO_2 sources and future application environments.

ECO2CELL Cube:
GKT's containerized pilot system bringing electrochemical CO_2 conversion to pilot scale © GKT

5. Connecting CO_2 sources with industrial applications

Industrial CO_2 streams vary in composition, volume and process conditions, while downstream processes have different product requirements. Flexibility is therefore an important part of the ECO2CELL concept.

Adjustable operating parameters enable different product pathways to be investigated, while the modular approach supports development at different scales. Potential fields of application include cement, steel, biogas and petrochemical industries, where significant CO_2 streams may be available.

The objective is to connect an available CO_2 source with a meaningful downstream use.

6. More than an electrochemical cell

Turning an electrochemical reaction into an industrial solution requires more than the cell itself. Gas handling, temperature control, safety systems and process control all need to work together, while process engineering and equipment integration become increasingly important at larger scales.

This is where ECO2CELL connects with GKT's broader engineering capabilities. By combining electrochemical technology with process and plant engineering, GKT can address the path from technology development towards future industrial integration.

The principle behind ECO2CELL is straightforward: use captured CO_2 as a carbon source, convert it into useful chemical building blocks and create new pathways for integrating carbon into industrial value chains.

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gkt-solutions.com/technologies/co_2-utilization

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POLYMER CHEMISTRY & BIOMATERIALS GROUP
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B–SMARTT!: Connecting Materials, Advanced Manufacturing and Life Cycle Analysis

The transition towards a more circular economy requires more than the development of new materials or manufacturing technologies. It requires access to the right expertise, infrastructure and partners to translate promising ideas into feasible solutions. Within the Interreg VI Flanders–The Netherlands project B–SMARTT!, academic and industrial partners join forces to create a cross–border innovation platform supporting SMEs throughout this process.

The Flanders-The Netherlands border region hosts a strong high-tech manufacturing industry, combined with biotechnology, life cycle analyses and advanced materials creating new opportunities for more sustainable products and production processes. Translating these developments towards industrial applications remains challenging, especially for small and medium-sized enterprises (SMEs).

B-SMARTT! (Biotechnology-driven, Smart, Market-oriented, Additive Manufacturing-based, R&D-supporting Technological Transition) addresses this challenge by bringing complementary expertise together within one cross-border innovation ecosystem. The consortium combines the academic expertise of Ghent University, the University of Antwerp and Maastricht University with the industrial and business expertise of Tenco DDM, Additive Mindset and DC Venturing.

From an idea towards a sustainable solution

Rather than focusing on one specific material or manufacturing technology, B-SMARTT! combines expertise across different stages of product development. The platform provides SMEs with access to knowledge and infrastructure related to advanced materials, advanced manufacturing and product validation including life cycle analyses, complemented by expertise in circularity, business development and market-oriented innovation.

This integrated approach is important because material development rarely takes place in isolation. The properties of a material determine how it can be processed, while manufacturing technologies introduce their own requirements. Innovative and biobased materials may offer clear advantages, but products based on these materials do not always meet all functional or market requirements. Similarly, not every resin can be used with every 3D printing technology, just as not every filament can be readily processed by every printer. At the same time, the resulting product needs to meet functional specifications and should increasingly be designed with its environmental impact and end-of-life already in mind. Material characteristics, manufacturing possibilities, life cycle analyses and final product requirements therefore need to be considered together.

B-SMARTT! addresses this through an iterative pathway from intake and co-creation to co-development and acceleration. Together with participating SMEs, product requirements are identified, materials and manufacturing strategies are selected, and concepts are prototyped, tested and validated before promising solutions are further prepared for scale-up and market introduction.

Advanced manufacturing as an enabler

Advanced manufacturing is the core of our approach. This extends beyond individual manufacturing technologies, such as 3D printers, robots or cobots, and includes their integration with digital information flows, design tools and production processes. Successful implementation therefore requires an understanding of the interaction between material, design, processing and final performance. By combining academic expertise in materials science and validation with industrial expertise in advanced manufacturing and product development, B-SMARTT! enables these aspects to be considered together.

Building resilience through cross–border collaboration

The B-SMARTT! approach closely reflects the need for resilience within the advanced materials and manufacturing/technology ecosystem. Technological innovation is increasingly multidisciplinary, and companies need to respond to changing material availability, sustainability requirements, manufacturing technologies and market demands. No single organization necessarily holds all the expertise required to address these challenges in a timely manner.

By connecting expertise and infrastructure across Flanders and the Netherlands, B-SMARTT! facilitates knowledge exchange across institutional and sectoral boundaries. Ultimately, the project aims to lower the barriers between a promising idea and its practical implementation, supporting SMEs in developing innovative and more sustainable products while contributing to a more connected, circular and resilient advanced materials ecosystem.

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Interreg Vlaanderen-Nederland
Gefinancierd door de Europese Unie

With support of:

VLAIO
provincie Limburg
Ministerie van Economische Zaken

B-SMARTT!

From Advanced Materials to Industrial Impact

JOANNEUM RESEARCH MATERIALS connects functional materials, scalable processes and system integration – from lab to fab.

Advanced materials enable progress in mobility, energy, electronics, healthcare and sustainable manufacturing. The challenge is not only to create materials with improved properties, but to transfer them into reproducible processes, functional components and scalable products.

The OECD describes advanced materials as materials intentionally designed to provide new or improved properties and targeted structural features for specific functional performance. This closely matches the MATERIALS approach: functionality emerges from material composition, micro- and nanostructure, interfaces, processing and system integration (Ref. 1). Europe's advanced materials agenda therefore emphasizes lab-to-fab transfer, pilot and demonstration infrastructures, industrial scale-up, digitalization, circularity and resilience, with Safe and Sustainable by Design serving as an important framework for future materials development (Refs. 2,3).

Connecting materials, structures, processes and systems

MATERIALS develops functional surfaces, thin films, micro- and nanostructures, printable materials, photonic components, sensors and integrated systems. Rather than treating material classes as isolated fields, MATERIALS connects high-performance polymers and functional silicones, particle-based inks, smart nanomaterials and coatings, electrospun fibres, bio-based systems and photonic or metamaterial structures.

Its development chain spans material and functional design, formulation and structuring, manufacturing, characterization and validation, scale-up and pilot production, and system integration. Simulation, data, quality assurance, sustainability and intellectual property are considered from the outset.

Where MATERIALS makes the difference

A distinctive capability is the combination of high-resolution micro- and nanostructuring with large-area replication. Mastering, step-and-repeat processes and roll-to-roll UV nanoimprint lithography transfer functional structures to flexible substrates at pilot scale. Applications range from biomimetic surfaces – including cicada-inspired antibacterial structures – to photonic films and microfluidic lab-on-foil systems.

A second key strength is the integration of material formulation and functional manufacturing with sensing and systems engineering. Functional inks, polymers and silicones are processed by screen, inkjet, coating, electrospinning and additive processes and combined with electronics and embedded intelligence. This enables flexible piezoelectric and tactile sensors, condition monitoring, smart surfaces, rapid oxygen sensing, energy harvesting and systems for robotics, medical technology, energy and industry.

MATERIALS also applies this logic to wood and other bio-based substrates. Surface functionalization, barrier functions, printed conductors and sensors can create functional and intelligent material systems.

JOANNEUM RESEARCH MATERIALS

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Pilot infrastructure as a bridge to industry

MATERIALS combines cleanroom and characterization infrastructure with micro- and nanostructuring, roll-to-roll processing, printing, coating, plasma and laser processing, photonics, electronics and system integration. Companies can investigate process windows, reproducibility, material compatibility, quality criteria and scale-up risks before industrial investment. The objective is a qualified demonstrator or pilot process with a defined route towards manufacturing – not an isolated laboratory result.

Digital development and responsible innovation

MATERIALS strengthens model- and AI-supported approaches for material design, formulation, process optimization and quality assurance, including fabrication-aware design, physics-informed models, data-driven process optimization, explainable AI for inline quality assessment and Edge AI for sensor fusion.

Performance, safety, sustainability and industrial feasibility are considered together. Resource efficiency, substitution of substances of concern, PFAS-free functional surfaces, bio-based materials, circularity and life-cycle considerations are addressed in line with Safe and Sustainable by Design principles (Ref. 3).

From research excellence to industrial value

MATERIALS positions itself as a technical integrator between scientific discovery and industrial implementation. By connecting scientific expertise with pilot infrastructure, digital methods and industrial application, it creates a practical lab-to-fab pathway towards reproducible processes, validated components and integrated systems – supporting shorter innovation cycles, resilient value chains and competitive, sustainable technologies made in Europe.

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GREENDECISION SRL

Toward Greener Electronics: A Cradle–to–Gate Assessment of All–Carbon Recyclable Electronic Materials

The fabrication of semiconductor devices, especially those used in flat–panel displays, has become a critical environmental challenge. The U.S. Environmental Protection Agency (EPA) identifies this sector as a significant contributor to climate change due to its substantial greenhouse gas emissions. Semiconductor manufacturing relies on a wide range of acidic and basic solutions, organic solvents, and toxic gases, generating large volumes of wastewater and airborne pollutants.

Beyond chemical emissions, semiconductor production is highly energy-intensive. In the United States, the industry accounts for approximately 1.3–2.0% of total electricity consumption within the manufacturing sector. This combination of energy demand and hazardous material use underscores the urgency of adopting more sustainable practices across the electronics value chain, from material sourcing to end-of-life management.

One promising avenue for reducing environmental impacts is the development of All-Carbon Recyclable Electronics (ACRE). These innovative materials, such as crystalline nanocellulose (CNC), carbon nanotubes (CNTs), and graphene, offer a recyclable alternative to traditional silicon- or metal-oxide-based components. Their integration into thin-film transistors (TFTs) could significantly reduce greenhouse gas emissions and mitigate the growing problem of electronic waste.

Because ACRE TFTs are a relatively new technology, life cycle assessment (LCA) data remain limited. To address this gap, a cradle-to-gate LCA was conducted to compare the environmental performance of ACRE-based TFTs with conventional amorphous silicon TFTs commonly used in liquid crystal displays (LCDs). The goal was to quantify the potential benefits of transitioning to carbon-based materials and to identify the most sustainable production pathways.

To model the ACRE TFT production, six scenarios were defined by combining three CNT synthesis routes (Arc discharge, CVD, and HiPco) with two energy-allocation approaches. Since primary laboratory data was collected for a batch of four devices, the "baseline" scenarios divide both material and energy inputs by four to represent average single-device production. In contrast, the "en4" scenarios allocate the full printer startup and operational energy of a four-device batch to a single transistor (while keeping material inputs divided by four) to account for high initial energy overheads.

Results show that the baseline ACRE scenario consistently exhibits the lowest environmental impact, with the High-Pressure Carbon Monoxide (HiPco) method emerging as the most sustainable CNT production route. Although the ink used to print the transistor represents only a tiny fraction of the device's total mass, especially compared to the glass substrate, HiPco still outperforms the Arc and CVD methods by approximately 0.1% and 0.2%, respectively. These differences, while small, are meaningful in the context of large-scale manufacturing.

However, several challenges remain. The synthesis of CNTs, CNC, and graphene is energy-intensive, and these materials collectively contribute more than 40% of the total environmental impact across multiple categories. The glass substrate also plays a significant role, particularly in categories related to ecotoxicity and resource use. Even the ink preparation process, despite its minimal mass, influences impact categories such as ionizing radiation and land use.

A sensitivity analysis further highlights the importance of energy efficiency. A ±50% variation in energy consumption leads to substantial changes in environmental impacts, with sensitivities of around 30% for ionizing radiation and 25% for land use. This finding reinforces the need for improved energy management and optimized processing conditions in future ACRE manufacturing.

Overall, the study demonstrates that ACRE TFTs hold significant promise for reducing the environmental footprint of semiconductor production. While further optimization is needed, particularly in material synthesis and substrate manufacturing, the results establish a strong foundation for advancing recyclable carbon-based electronics.

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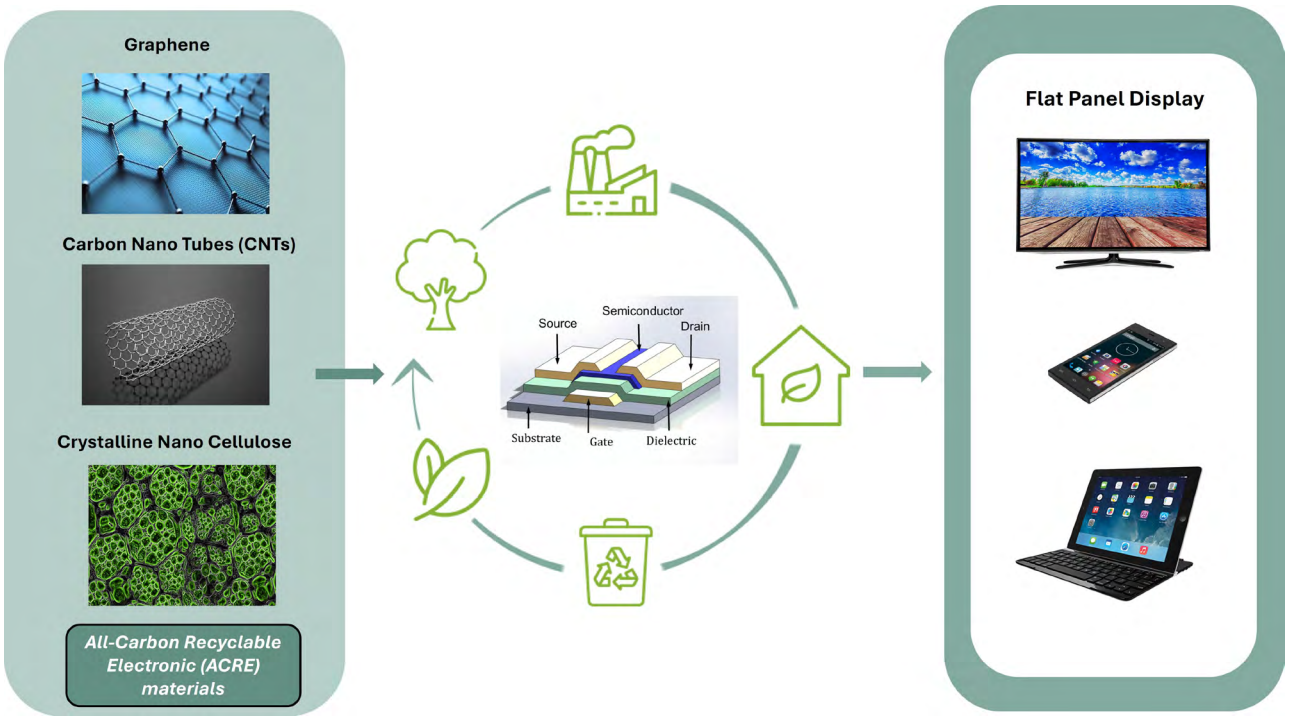
https://doi.org/10.1039/d5su00815h



Schematic representation of the All-Carbon Recyclable Electronic (ACRE) thin-film transistor (TFT) life cycle. The diagram illustrates the integration of sustainable, ink-processable raw materials—graphene, carbon nanotubes (CNTs), and crystalline nanocellulose (CNC)—into printed TFT devices designed for a circular life cycle (middle) to power next-generation flat-panel displays and consumer electronics (right)
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GREENDECISION SRL

The Social Dimension in Safe and Sustainable by Design Assessment of Advanced Materials

Partners: GreenDecision, Ca' Foscari University of Venice, Yordas Group, Laurentia Technologies, Emerge.

Developing advanced materials requires integrating goals of improved technical performance, a better sustainability profile, and high safety standards. Decisions taken during research and development can influence the entire life cycle of an innovation, from the raw materials sourcing and production to use and end of life. Incorporating these aspects early in the assessment is therefore essential to support the development of materials that are truly sustainable by design across the three dimensions of sustainability: environmental, social, and economic.

A recently published study led by GreenDecision and developed within the SUNSHINE and SUNRISE European projects explores how Social Life Cycle Assessment (S-LCA) can support this process. The study applies a screening-level S-LCA to an innovative PFAS-free, nano-enabled anti-stick coating developed for industrial baking trays and compares it with a conventional Teflon-based benchmark.

Using the Social Hotspots Database, the assessment investigates potential social risks across the supply chain and considers different geographical sourcing and production scenarios. The analysis shows that the geographical location can play a major role in determining potential social risks, and suppliers' transparency is therefore crucial for validating the findings of the screening assessment. In the investigated case, the sourcing of specific raw materials represented a particularly relevant hotspot, with workers and local communities among the stakeholder groups most exposed to potential social risks.

These findings highlight an important role for social sustainability assessment beyond the simple comparison of alternative materials. When applied during early R&D stages, S-LCA can become a learning and decision-support tool: it can indicate where additional information is needed, encourage dialogue with suppliers, improve supply-chain traceability and support the identification of alternative sourcing strategies while changes to the developing product are still possible and comparatively less costly.

The case study also illustrates some of the current challenges of applying S-LCA to emerging advanced materials, particularly the limited availability of technology-specific social data. At the same time, these limitations reinforce the importance of transparency, supplier engagement and iterative assessment as innovation progresses.

Integrating the social dimension into SSbD therefore offers an opportunity to make sustainability assessment an active part of the innovation process – helping developers learn from emerging evidence and adapt material and supply-chain choices as technologies move towards the market.

The full research article can be found online.

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https://doi.org/10.20900/jsr20260023

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The GreenDecision team © GreenDecision Srl

GREENDECISION SRL

Bridging AI and Human Expertise for AdMa development: A Portfolio of Relevant Indicators to Operationalize Safe and Sustainable by Design

As Europe accelerates its transition towards a circular, climate–neutral economy, the advanced materials sector faces a crucial dual challenge: maintaining industrial competitiveness while ensuring safety and sustainability from the earliest stages of research. Designing materials with safety and sustainability in mind already at low Technology Readiness Levels (TRLs) allows for maximum design flexibility, reduces long–term R&D costs, and prevents potential environmental or health lock–ins. However, translating high–level guidelines like the European Commission's Safe and Sustainable by Design (SSbD) framework into industrial reality remains a major roadblock. Innovators and Small and Medium Enterprises (SMEs) frequently struggle with fragmented datasets and an overwhelming array of sustainability metrics scattered across different existing methodologies and software tools.

To address this gap and embody the spirit of SSbD adaptive innovation, a research team has developed a pioneering, AI-assisted workflow that focuses on identifying sustainability and functionality indicators to be prioritized at early stages of materials development. Supported by the EU Horizon Europe SUNRISE project, the team conducted an exhaustive review of 29 state-of-the-art sustainability and risk assessment tools, extracting a raw database of 986 distinct indicators spanning environmental, social and economic sustainability and functionality dimensions.

The team deployed an innovative collaborative strategy combining knowledge from Large Language Models (LLMs) with sustainability expert guidance to ensure harmonization, coherence and meaningful output among indicators. A locally deployed DeepSeek instance was first utilized to analyze the database and extract a standardized set of indicator categories. Following this, GitHub Copilot was integrated within a code-editor environment to systematically map and assign the 986 raw indicators to their respective groupings. This AI-driven clustering substantially accelerated the initial stages of knowledge extraction by facilitating the harmonization of indicators and reducing redundancy due to indicators that assess the same feature within a specific dimension (e.g., environmental sustainability) but are structured differently (e.g., through a question rather than a quantitative measure). However, the process highlighted that artificial intelligence is not a standalone solution.The tested models frequently struggled with subtle technical nuances. For instance, the AI often failed to accurately distinguish whether a metric referred specifically to "circular economy" principles or general "waste management", and commonly misclassified "ozone depletion" indicators within the general "climate change" indicator category. Indeed, it generated indicator categories that were either too broad or overly specific. Rigorous, human-in-the-loop expert intervention was therefore essential to refine, correct, and validate the AI-generated categorization. This synergy successfully consolidated the 986 indicators into 103 harmonized, high-level indicator categories.

Through a subsequent statistical prioritization, the study identified the most prevalent indicator categories across current implementable tools, offering a practical screening checklist of relevant indicators to be considered for innovators. In the environmental dimension, "emissions", "waste management", and "resource efficiency" emerged as paramount. For social sustainability, "employment", "impacts on local communities" and "work fairness" were highly emphasized, while "market potential" and "R&D innovation" emerged as the most relevant for economic sustainability. "Durability" and "consumer needs" emerged as the priorities for the functionality dimension.

By providing a structured, open-access portfolio, this research acts as a vital toolkit for the advanced materials community. It enables companies, particularly SMEs, to identify the key areas of focus when developing innovations and to anticipate data collection requirements from the early stages of laboratory development, reducing R&D costs and boosting the competitiveness of European innovative technologies in full alignment with the SSbD framework and EU Competitiveness Compass.

References

The full study, including the comprehensive indicators database as an Excel file, is published open-access in RSC Sustainability. DOI: https://doi.org/10.1039/d5su00883b.

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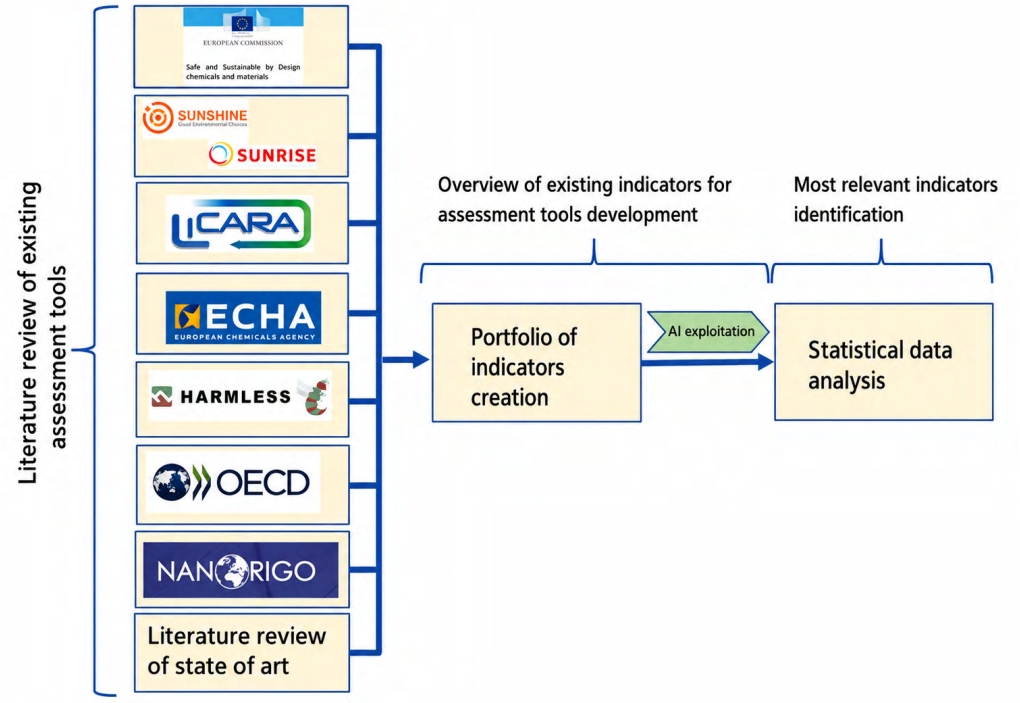

The workflow for developing the portfolio of environmental, social, economic and functionality indicators to support the operationalisation of the JRC-SSbD framework. doi.org/10.1039/d5su00883b © GreenDecision Srl

Member Updates

And the CHASE Industry Award 2026 goes to:

Since 2022, the CHASE Industry Award has celebrated outstanding academic achievements within the Competence Center CHASE. Sponsored by the Association of the CHASE Company Partners, the prestigious accolade comes with a €2,500 cash prize for exceptional diploma theses.

This year's award goes to Markus Fritz for his outstanding work "Simultaneous in-line Raman and mid-IR spectroscopy for monitoring of complex crystallization systems in the pharmaceutical industry". Conducted at TU Wien, Institute of Chemical Technologies and Analytics, alongside project partner Thermo Fisher Scientific, Patheon Austria GmbH & Co. KG, the thesis was supervised by Bernhard Lendl, Karin Wieland, and Georg Ramer. Highlighting its scientific impact and strong industrial relevance, the research was also honored with the Michael Maiwald Prize at the DECHEMA Herbstkolloquium Prozessanalytik 2025. The prestigious Michael Maiwald Award, known until 2024 as the Process Analytics Award, is presented annually by the Process Analytics Working Group (AK PAT) for the best thesis – bachelor's thesis, master's thesis, or dissertation – in the field of process analytics in the German-speaking region (DACH).

As part of the award, Markus presented his findings directly to the CHASE Partner Board, engaging with leading industry and scientific experts. The award was officially presented by Walter Tesch (OMV, Chairman of the Association of CHASE Company Partners), together with Christian Paulik (CHASE Scientific Director) and Alexander Preinfalk (Project Partner, Thermo Fisher Scientific).

The next application round is already open. Submissions for the upcoming Industry Award are accepted until October 31, 2026.

Learn more: here

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Walter Tesch, Alexander Preinfalk, Markus Fritz, Christian Paulik © Karin Wieland

AC2T RESEARCH GMBH

Wear Less, Reuse More: Laser Cladding for Increased Lifetimes and Circular Economy

Circular economy asks industry to keep valuable components in service longer, repair them instead of replacing them, and use resources carefully. Laser cladding can support all three goals: a laser deposits a dense, wear-resistant layer only where needed, worn surfaces can be refurbished rather than discarded, and lower-impact alloys can be selected alongside recycled feedstock. Yet the technology also consumes alloy powders, process gases and electricity. A new life cycle assessment by H. Rojacz (AC2T research GmbH) and G. Piringer (Hochschule Burgenland) quantifies these impacts from raw materials to finished wear-protection solutions and shows environmental hot spots.

Wear is more than a maintenance problem. When a highly loaded surface fails, downtime, replacement parts and the loss of a much larger component can result, even though its bulk material may remain functional. Laser metal deposition (LMD), commonly called laser cladding, takes a targeted approach: powder is melted onto a substrate to form a dense, metallurgically bonded coating. Only surfaces exposed to abrasion, heat or corrosion need to be modified, and the same process can restore worn components. Applications range from wind-turbine components and slurry pumps to wear plates and brake discs.

A major advantage is that a comparatively low-impact carbon-steel body can carry a thin, high-performance surface layer instead of being manufactured entirely from a costly, high-impact wear-resistant alloy. The substrate and the resources already invested in it can remain in service.

The study assesses seven cladding concepts, covering raw materials, gas atomization, LMD and complete wear-protection solutions. Calculations follow the ISO 14040 framework and combine primary process data with global-average market and literature data. The cradle-to-gate assessment considers one square metre of wear plate with a 5 mm unalloyed steel substrate and a 1.6 mm cladding. Transportation, use and end-of-life are excluded because they depend strongly on the application. Results should therefore be viewed as production-stage benchmarks and a material-selection framework, rather than a complete lifetime assessment.

The clearest result is that **material choice matters most**. Substrate and cladding raw materials account for 66.6–87.8% of total global warming potential. Cobalt- and nickel-based alloys show the highest upstream impacts, while iron-based concepts generally perform better. Virgin tungsten carbide can also carry a substantial carbon burden.

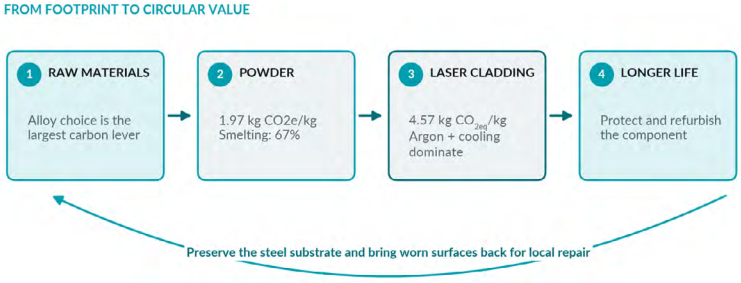
The lowest mass-specific footprint is obtained for an iron-aluminide coating reinforced with recycled hardmetal scrap (FeAl + HMS), at 4.44 kg CO_2eq/kg of wear-protection solution. FeAlB follows at 4.78 kg CO_2eq/kg, while FeCrC and FeCrNbVCB are around 5.5 kg CO_2eq/kg. NiCrBSi reaches 7.98 and CoCrC 13.31 kg CO_2eq/kg. Replacing virgin tungsten carbide with recycled hardmetal scrap saves more than 2.8 kg CO_2eq/kg of coating solution.

Processing contributes less than material production, but its hotspots are actionable. Gas atomization adds 1.97 kg CO_2eq/kg of powder, with melting responsible for around 67% and nitrogen for 20.5%. LMD adds 4.57 kg CO_2eq/kg of deposited cladding. Argon production is the largest contributor (38.3%), followed by laser cooling (31.5%) and electricity (22.5%). Reducing argon flow from 26 to 15 L/min lowers the LMD footprint from about 4.6 to 3.8 kg CO_2eq/kg.

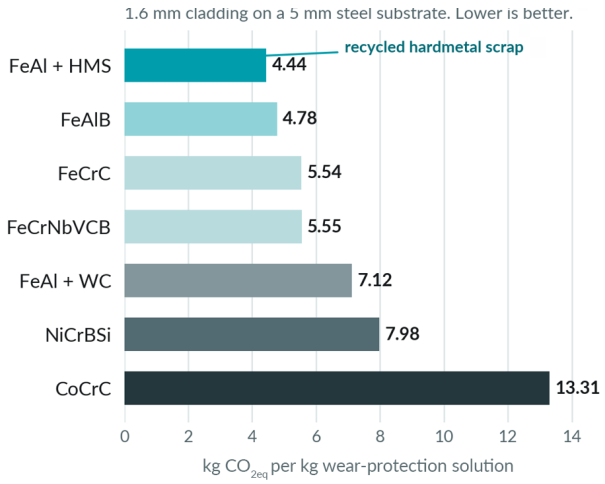
The results translate directly into improvement measures: renewable electricity, more efficient melting and cooling systems, optimized gas flows and increased use of recycled feedstocks can all reduce emissions.

Ultimately, the strongest circular benefit may come from **repairing rather than replacing** a component. By functionalizing only the damaged surface, laser cladding can preserve the material, energy, emissions and economic value already invested in the component. The precise benefit depends on geometry, process productivity and lifetime achieved, but the study demonstrates that combining **low-impact materials, efficient processing and refurbishment** can make wear protection significantly more sustainable and ready for circular manufacturing.

Study stages and circular-economy leverage points. The life-cycle assessment is cradle-to-gate; transport, use and end-of-life were outside the model.



Editorial chart based on the total GWP100 values reported in the publication



DI Dr.techn. Harald Rojacz studied energy- and environmental science as well as materials science. He is a key scientist for sustainable materials for tribology specializing in sustainable wear protection solutions and wear reduction strategies.

References:

Rojacz H., Piringer G. Carbon footprint of laser claddings: From raw materials and processing to wear protection solutions. Surface & Coatings Technology 508 (2025) 132187, doi.org/10.1016/j.surfcoat.2025.132187

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POLYMER CHEMISTRY & BIOMATERIALS GROUP
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Next–Generation Injectable Hydrogels: Healthy Teeth Project Advances Regenerative Therapies for Periodontal Disease

Periodontitis is a widespread inflammatory disease that destroys tooth–supporting bone and tissues, representing the leading cause of tooth loss in adults. In the Interreg France–Wallonia–Flanders region alone, an estimated 1.5 million citizens suffer from the condition, generating over 4 billion euros in annual healthcare costs. Because conventional scaling and antimicrobial treatments often fail to achieve long–term tissue regeneration, and existing commercial implants are frequently dislodged by the mechanical forces of chewing, new therapeutic strategies are urgently needed.

Within this framework, the European Healthy Teeth project develops advanced biomaterials, injectable formulations, and 3D-printed constructs to restore oral health. Contributing directly to these objectives, researchers at Ghent University in collaboration with University of Lille have engineered an in situ–forming, cell-laden hydrogel designed to fill periodontal defects and actively stimulate biological repair.

Overcoming Delivery Bottlenecks with Cold–Water Fish Gelatin

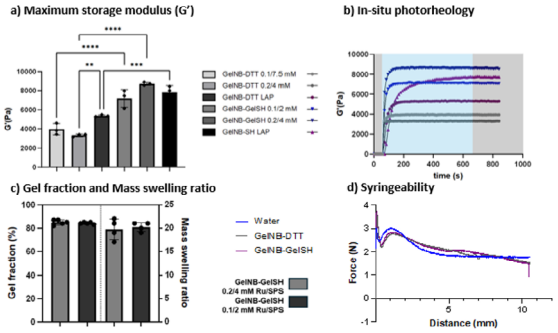
A central goal for injectable periodontal therapies is achieving smooth delivery into narrow pockets before solidifying into a stable matrix. Traditional mammalian gelatin formulations gel prematurely at room temperature due to their upper critical solution temperature behaviors, requiring external heating that complicates clinical handling. To overcome this, the Ghent University team utilized cold-water fish gelatin, which contains fewer proline and hydroxyproline crosslinking residues so solutions remain liquid at ambient operating temperatures.

By chemically modifying this base material into norbornene-functionalized gelatin (GelNB), researchers established a step-growth network crosslinked with either 1,4-dithiothreitol (DTT) or thiolated gelatin (GelSH). Syringeability tests performed by the project coordinator at University of Lille confirmed that these formulations flow effortlessly through fine 19G needles with an extrusion force comparable to water, enabling the minimally invasive, personalized filling of complex periodontal defects targeted by the Healthy Teeth initiative.

Rapid Visible–Light Curing and Tissue–Matched Mechanics

To convert the injected liquid into a durable, retentive implant, the system uses a biocompatible Ruthenium and sodium persulfate (Ru/SPS) photo-initiator developed by Prof. Khoon Lim and his team at the University of Sydney. When exposed to standard dental blue light, the hydrogel cures within 30 seconds without the cellular toxicity associated with ultraviolet radiation.

The crosslinked networks demonstrated gel fractions exceeding 85%, ensuring high polymer conversion and minimal release of unreacted components into surrounding tissues. Mechanical testing showed storage moduli reaching up to 8.5 kPa for GelNB-GelSH formulations, closely matching the physiological stiffness of native gingival and mucosal environments. Furthermore, the cured hydrogels maintained stable mass swelling ratios below 20, effectively preventing the severe volumetric expansion or shrinkage that leads to implant failure in current commercial alternatives.

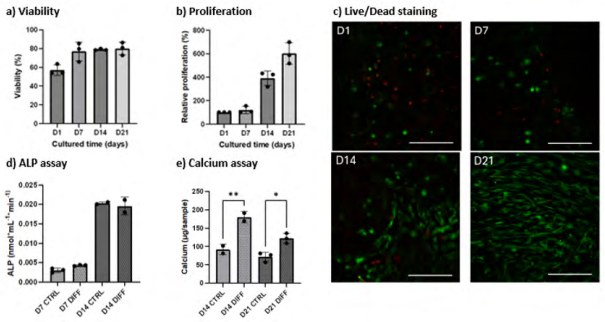


a) Maximum storage modulus (G') reached in the plateau phase during in situ rheology measurements. b) Representative rheological measurements of GelNB-DTT and GelNB-GelSH hydrogels with a polymer concentration of 10 wt% with blue area indicating period of light exposure. c) Gel fractions and mass swelling ratio for all different hydrogel formulations. d) Injectability of the modified gelatin formulations compared to water: Force-displacement measurements recorded with a texture analyzer during extrusion through a 19G needle.

Stem Cell Delivery and Accelerated Bone Mineralization

The hydrogel platform was validated as a delivery vehicle for dental pulp–derived mesenchymal stromal cells (DP-MSCs). Following light curing, encapsulated stem cells demonstrated strong resilience, recovering to over 80% viability by day 7 and maintaining long-term survival through 21 days of culture. Microscopic analysis confirmed that the cells transitioned from rounded into elongated, spread morphologies, indicating successful attachment within the 3D scaffold.

This structural adaptation was accompanied by a 4-fold surge in cellular metabolic activity between days 7 and 14. Crucially, the encapsulated stem cells underwent robust osteogenic differentiation, characterized by rising alkaline phosphatase activity and significant calcium matrix mineralization by day 14.



a) Cell viability on day 1, 7, 14 and 21 illustrating mean and standard deviation and individual data points (n=3) b) Relative proliferation normalized against metabolic activity at day 1 (=100%) (n=3) c) Live (green, calcein-AM)/ Dead (red, PI) images from a representative donor for day 1, 7, 14 and 21; scale bar = 100µm. d) ALP production on day 7 and 14 comparison between differentiated groups and non-induced controls (n=3) e) Calcium production on day 14 and 21 comparison between differentiated groups and non-induced controls (n=3).

By uniting liquid-like syringeability, rapid chairside blue-light curing, and verified osteoinductive properties, Ghent University's hydrogel platform delivers directly on the Healthy Teeth mission: advancing safe, clinically viable regenerative solutions to combat periodontitis and restore long-term patient quality of life.

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Publication

Blue Light-Cured Thiol-Ene Fish Gelatin as a Tunable Hydrogel Platform for Periodontitis Therapy

*Emma de Meij1,2, Nele Pien1,2, Marguerite Meeremans1,2, Tatyana Auvermann3, Juergen Siepmann3, Florence Siepmann3, Khoon Lim4, Catharina De Schauwer1 and Sandra Van Vlierberghe2**

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doi.org/10.21203/rs.3.rs-8978910/v1

nature.com/srep/

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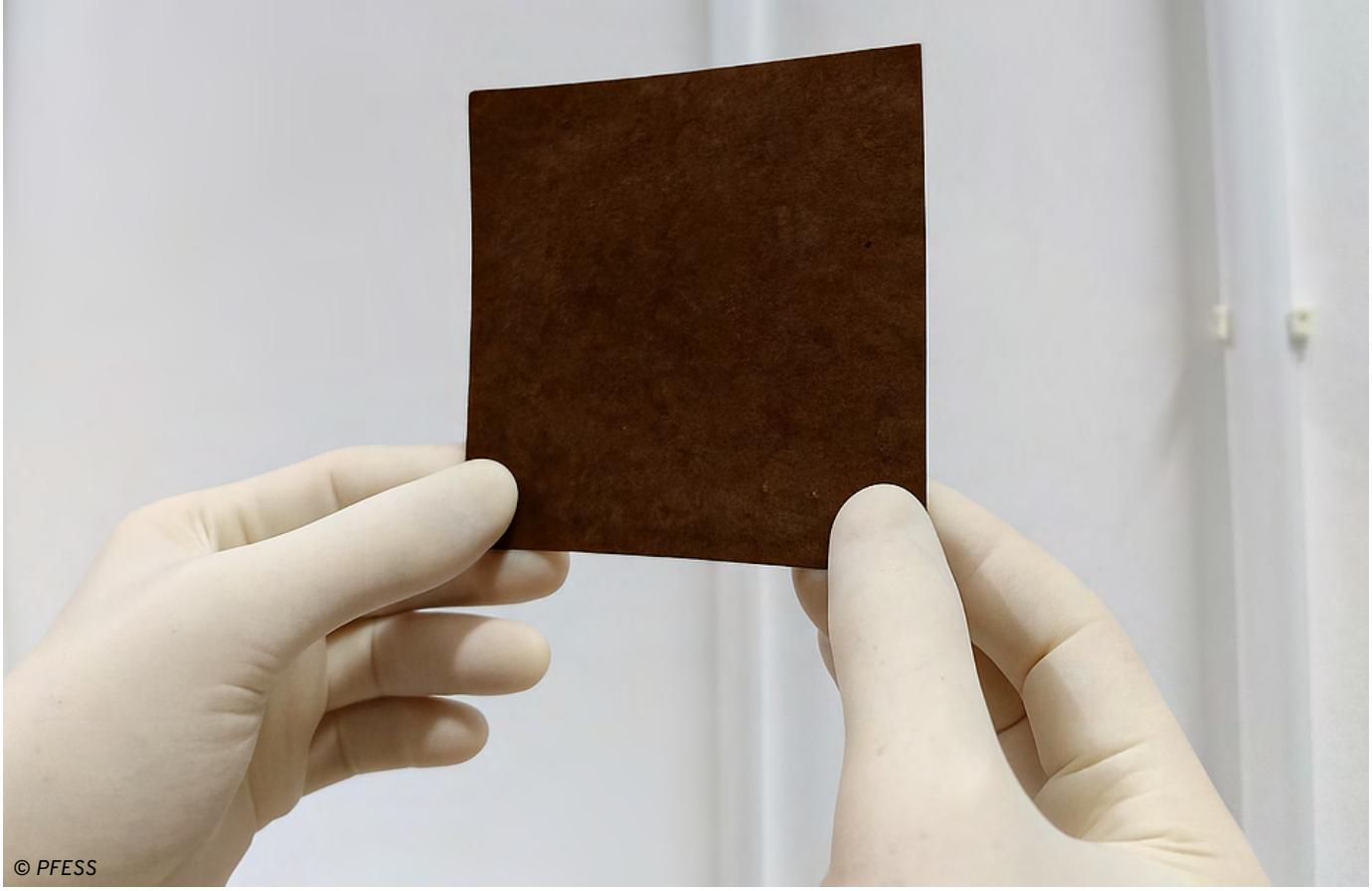
Project Activities & Updates

Materials Day 26 - ACstyria © ACStyria.

Replacing Forever Chemicals in Energy Storage Technologies

Seven partners from four European countries collaborate to identify safer and more sustainable alternatives to PFAS.

Are per- and polyfluoroalkyl substances (PFAS) truly irreplaceable? To address this question in the context of energy storage systems, members of the BioNanoNet Association, including the University of Graz (Department of Environmental Systems Sciences), the BOKU University (Institute of Waste Management and Circularity), and Ecolyte GmbH, have joined forces with BNN (Austria), Biobide (Spain), the University of Trieste (Italy), and the Federal Institute for Materials Research and Testing (BAM, Germany) in the project PFAS-Free Membranes for Energy Storage and Conversion Systems (PFESS). PFAS-based materials are widely used in clean energy technologies, including water electrolysers, fuel cells, and redox flow batteries (RFBs). The latter represent an emerging technology for large-scale energy storage. Key components such as proton-selective membranes are currently manufactured predominantly from polyfluorinated polymers such as PFSA and PTFE. In addition, gaskets often contain PVDF, while electrodes may be fluorine-doped or coated with PFSA-based binders. These components may also contain potentially persistent nanomaterials, such as carbon nanotubes (CNTs) and graphene, as well as substances of concern (SoC) or substances of very high concern (SVHC). Such substances and potentially hazardous nanomaterials may be incorporated into battery systems and may be unintentionally released to the environment. Consequently, mitigation measures should be initiated at the earliest possible stages of material and technology development, a principle that is consistent with the Safe and Sustainable by Design (SSbD) approach. Many of these materials could potentially be replaced by safer alternatives.



© PFESS

The PFESS project aims to compare, identify and compile data on potentially hazardous substances used in RFB materials and key functional elements, alongside promising PFAS-free alternatives such as PEEK- or nanocellulose-based membranes, non-halogenated gaskets, binders, and flame retardants. Information on their technical and environmental performance will be collected in an RFB-specific product inventory that will serve as the foundation for life cycle assessments. In parallel, laboratory-scale release and recycling tests will be performed. Membranes containing PFAS and PFAS-free alternatives will be shredded to simulate recycling and regranulation processes while aerosol measurements are conducted. The resulting dust, including ultrafine and fine particles, as well as the recovered regranulates, will be collected and tested for eco(toxicity). Ecotoxicity studies will include assessments using zebrafish and Daphnia magna, while human toxicity evaluations will be carried out using advanced skin and lung models. The primary data generated through the product inventory, release experiments, and toxicity studies will be used to perform a Chemical Footprint Assessment (CFA) using USEtox and an organisational health and safety (OHS)-driven social impact model in collaboration with our associated partner Claudia Mair-Bauernfeind (TH Rosenheim). The project results, together with a stakeholder workshop, will be used to derive SSbD key performance indicators and recommendations for sustainable RFB systems free of hazardous substances.

The expected results will provide technical guidance to support the production of PFAS-free RFBs, improving occupational health and safety while reducing environmental risks. Within the project, BNN is responsible for SSbD activities, dissemination, and stakeholder engagement.

The project is coordinated by Florian Part (BOKU University), supported by Sarah Strobl and Martina Zimek (both University of Graz).

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Explore PLANETS' Latest Training Materials

Discover how the Horizon Europe project PLANETS is advancing Safe-and-Sustainable-by-Design (SSbD) – while making its knowledge accessible through a growing collection of publicly available training materials.

About PLANETS: The project aims to demonstrate the applicability of the SSbD Framework by developing safer and more sustainable alternatives for three key classes of molecules in the chemical industry: plasticizers, flame retardants, and surfactants. The new molecules will be developed to TRL 6 and subsequently incorporated into widely available consumer products at TRL 7. PLANETS takes a holistic approach, aiming to deliver solutions that are safer for workers and consumers, significantly reduce environmental impacts, and remain economically viable. Social aspects are also considered throughout the three value chains, supporting the transition towards safer and more sustainable chemicals and products.

Knowledge sharing is at the heart of PLANETS: the project is developing and delivering internal training activities and making its training materials accessible to a growing community of external users.

Explore the publicly available PLANETS training materials here:

- Safe-and-Sustainable-by-Design (SSbD) scoping: SSbD policy background, basics, actions of scoping, the PLANETS SSbD workflow, as well as practical exercises in breakout groups on system boundary definition
- SSbD Tier 1 assessment: theory, application and adaptation
- Conducting a SSbD Tier 2 assessment using QSAR modelling
- Introduction to FAIR data & models, and Digital Product Passport (DPP)
- Introduction to Life Cycle Sustainability Assessment (LCA)
- Training on Environmental LCA (eLCA)
- Training on Life Cycle Cost assessment (LCC)
- Training on Social Life Cycle Assessment (sLCA)

More information about the PLANETS project is available on the project's website.

Role of BNN in PLANETS

Communication & Dissemination, Stakeholder Engagement, Graphic Design and Training.

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What Are Surfactants and Why Should We Care?

The Horizon Europe project PLANETS has prepared an infographic on surfactants for explaining them in a clear and accessible way:

- WHAT surfactants are
- WHERE they are used
- WHY they are important in our daily lives
- HOW they work
- The sustainability and safety CHALLENGES they present
- HOW the Safe-and-Sustainable-by-Design (SSbD) approach can drive innovation
- What the FUTURE of safer and more sustainable surfactants could look like

From cleaning products and personal care items to injectable drugs, paints, and many other products, surfactants are all around us and play a vital role in modern society. As we work towards a safer and more sustainable future, it is important to rethink how these chemicals are designed and produced.

This infographic aims to provide that clarity in a simple, visual format. Check it out and feel free to share!

More information about the project can be found on the PLANETS website.

Role of BNN in PLANETS

Communication & Dissemination, Stakeholder Engagement, Graphic Design and Training.

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iLCA4SSbD Kick–Off Meeting

Launching the Technical and Strategic Roadmap of the Project

On June 1, 2026, the EU–funded project iLCA4SSbD officially started its activities. The project aims to accelerate the industrial uptake of Life Cycle Assessment (LCA) in Safe and Sustainable by Design (SSbD) with the support of artificial intelligence (AI).

The project team will develop a user-friendly digital platform that supports integrated LCA (iLCA) and provides access to state-of-the-art life cycle sustainability assessment methods, tools, and datasets.

The **iLCA platform** will be established as a 3-tiered approach, fully aligned with the European Commission's SSbD framework. Each tier corresponds to an integrated methodology (supported by a toolbox) for **safety, environmental, social and economic sustainability assessment** at different stages of the innovation process, requiring a different level of data and expertise.

From **June 15 to 17, 2026, the iLCA4SSbD EU-project** organized its first highly strategic meeting in **Valencia, Spain**. The event successfully accommodated both in-person attendees and online participants, bringing together academic experts, industry leaders, and European Commission representatives to set the project's trajectory.

Day 1: Establishing Technical Foundations and Alignments

The meeting opened with welcome speeches from the Project Coordinator **Anne-Chloé Devic and Alexander Björling** (SSbD-CE). The day focused on high-level European vision and project technical alignment. The meeting included presentations on:

- **SSbD & LCA Context** by Irantzu Garmendia (European Commission Joint Research Centre). She presented the SSbD revised framework and the central role that LCA occupies within it.
- **European Commission expectations:** Fatima Gonzalez, the European Commission Project Officer, outlined the strategic expectations and context for the project.
- **Work Package walkthroughs:** After short partner introductions, Work Package (WP) leaders walked through the operational objectives of the eight technical WPs.
- The day concluded with an **interactive panel** discussion focused on aligning all WPs and their tasks towards the project goals, moderated by Alexander Björling.

Day 2: Mapping Value Chains and Case Studies

The second day of the meeting shifted the focus towards practical applications, testing the project's methodologies across **five distinct industrial case studies**. Breakout sessions were organized and moderated by the RIVM team (Susanne Waaijers-van der Loop and Lowik Pieters) performing a first scan of the case studies and the specific value chains:

1. **Batteries:** Led by BASF.
2. **Surfactants:** Led by SYENSQO.
3. **Composite Blocker:** Pitched by IPC.
4. **Smart Textiles:** Presented by AVANZARE.
5. **Ethanol:** Led also by BASF.

Following these technical workshops, the YORDAS team outlined strategies for maximum dissemination and market impact. To conclude the day's administrative sessions, Anne-Chloé Devic, coordinator of the project (from SSbD-CE), together with Hildegard Luhmann and Oliver Panzer (from ERS) detailed financial and administrative workflows.

Day 3: Risk Management and Immediate Action Plans

The final morning session, on day 3, focused entirely on the months ahead. A concrete Action Plan for the first six months of the project was developed and the strategic risk register was reviewed. To ensure alignment, WP leaders reconvened to synthesize the case study findings from Day 2 and directly embed them into the project's technical roadmap. The meeting concluded with a final closing session and a farewell lunch.

The whole team of the iLCA4SSbD project invites you to stay tuned for all the latest news, events, workshops and results of the project by visiting its recently launched website and following us through our LinkedIn channel.

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Recap of ATIMA Activities (June–August 2026)

ATIMA: Driving Innovation in Austria in the field of Advanced/Innovative Materials for a Sustainable Future.

Over the last few months (June–August 2026), ATIMA and its partners have continued their activities for raising awareness on the project and its goals, engaging with different stakeholder groups, and strengthening the identity of Austria's advanced/innovative materials (AdMa) community.

Highlights of activities in the last three months include:

Training session with AM-Austria
(02.06.2026, Vienna, Austria) – AM-Austria

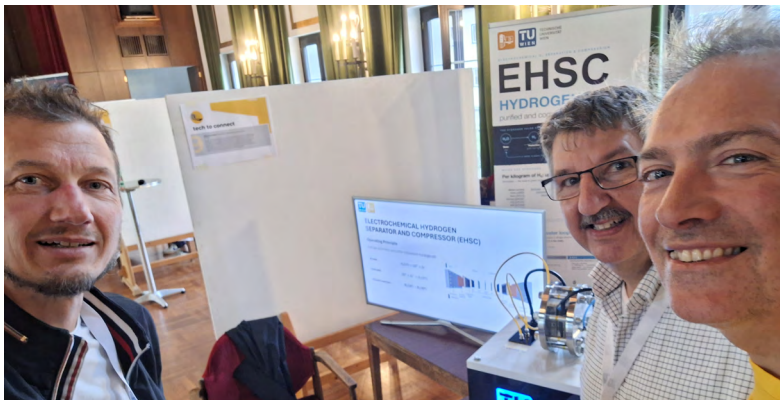
On 2 June 2026, around 20 participants joined an AM-Austria training session at FH-Technikum Vienna on occupational safety and surface treatment. Expert presentations by Ewald Babka and Thomas Gruber were complemented by a tour of the "Material Science & Mechanical Systems" Competence Centre. The event highlighted the importance of knowledge transfer, networking and practical expertise for strengthening Austria's Advanced Materials community. More details on the project website.

Vorarlberger Innovationsbericht (Innovation Report) 2026
(02.06.2026, Dornbirn, Austria) – V-trion

The Smart Textiles Platform Austria contributed to the Vorarlberg Innovation Report 2026, highlighting its role as an interdisciplinary network connecting industry, research and stakeholders. The contribution showcased activities in networking, knowledge and technology transfer, and collaborative innovation, supporting the development and market uptake of smart textile solutions. Its inclusion also strengthened the visibility of Advanced Materials and smart textiles within the regional innovation ecosystem. More details on the project website.

TechForum Millstatt 2026
(07–10.06.2026, Millstatt, Austria) – BNN

TechForum: Millstatt 2026 brought together experts from science, business and innovation from 07–10 June, focusing on AI, Quantum Technologies and Water. Advanced Materials featured prominently as enablers of innovation. Representing ATIMA, Andreas Falk organized, chaired and moderated the Science-to-Technology Water Session, fostering exchange on innovative solutions to water-related challenges and strengthening cross-disciplinary collaboration. More details on the project website.



Next3D
(08–10.06.2026, St. Georgen im Schwarzwald, Germany) – AM-Austria

The NEXT3D congress in Germany brought together European experts in industrial additive manufacturing from 8–10 June 2026. The practice-oriented event showcased live 3D printing, tool inserts for series production and advanced post-processing techniques. Dr. Johannes Gartner, AM-Austria President, presented on "The Future of Additive Manufacturing in the EU". The event also offered valuable opportunities for networking and promoting ATIMA's key messages. More details on the project website.

Biopolymer Team Meeting
(11.06.2026, St. Pölten, Austria) – BIZ-UP

The Biopolymer Team Meeting Q2, held on 11 June at NDU St. Pölten, brought together stakeholders from research, industry and regional innovation networks to discuss bioplastics, circular economy and sustainable materials. Veronika Miron (BIZ-UP) presented outcomes from the "Roadmap Sustainable Packaging & Food Processes" workshop, highlighting ATIMA's role and roadmap in advancing cross-sector knowledge exchange and sustainable material applications. More details on the project website.

Meetings to inform regional representatives about the Austrian AdMa-Roadmap
(May-July 2026, online) – BNN, all

From May to July 2026, ATIMA partners engaged with representatives from Austrian provinces to present the developing Advanced Materials (AdMa) Roadmap and gather regional feedback. These discussions helped shape the roadmap into a relevant resource for Austria's AdMa community. The roadmap will be officially launched on 14 October 2026 in Lustenau, followed by presentations in Linz and Graz in November. More details on the project website.

Auto Reborn: Expertise in taking plastics back onto the road

(18.06.2026, Braunau & Mühlheim am Inn, Austria) – BIZ-UP

The Auto Reborn conference, co-organized by A2LT, brought together experts to explore how recycled plastics can return to automotive applications. ATIMA contributed a focus on circular solutions for Advanced Materials and post-consumer recycled (PCR) materials, gaining valuable insights into value-chain requirements and innovative lightweight materials for sustainable and resource-efficient mobility. More details on the project website.

Impulsvortrag (keynote speech) "AdMa in Europe"

(22.06.2026, Krems, Austria) – BNN

On 22 June 2026, ATIMA coordinator Andreas Falk delivered a keynote on “Advanced Materials in Europe” at Karl Landsteiner University in Krems. The event explored the growing relevance of AdMa in Europe and opportunities for collaboration. Discussions highlighted potential research on the interaction between AdMa and physiological systems, as well as future cooperation in knowledge transfer, education and training. More details on the project website.

Medical.Materials 2026

(23.06.2026, Linz, Austria) – BIZ-UP

The Medical.Materials 2026 event in Linz brought together around 40 experts to discuss medical materials and advanced manufacturing, including smart textiles, biosensors and wearable technologies. Veronika Miron (Business Upper Austria) introduced ATIMA, while Andreas Falk (BNN) presented Advanced Materials as drivers of innovation in healthcare. The contributions highlighted ATIMA’s role in cross-sector collaboration and knowledge transfer. More details on the project website.

FTI Workshop as part of the 48th A2LT plenary meeting at Miba
(25.06.2026, Laakirchen & Vorchdorf, Austria) – BIZ-UP

On 25 June 2026, ATIMA joined the 48th A2LT Plenary Meeting and FTI Workshop at Miba in Laakirchen and Vorchdorf. The EUREKA Lightweighting Call 2026 workshop provided a platform to exchange ideas, develop innovative project concepts, and explore international R&D cooperation. ATIMA contributed expertise on Advanced Materials, helping to identify new opportunities and strengthen the lightweighting innovation network. More details on the project website.

SuSChemE-Sustens2 conference
(28–30.06.2026, Athens, Greece) – BNN

From 28–30 June 2026, the SuSChemE-Sustens2 Conference in Athens brought together experts on sustainable and climate-neutral technologies. ATIMA contributed to strengthening links between the Advanced Materials and chemistry communities, connecting with the SusChem Community and SusChem-AT. Austrian representatives co-organized, chaired and presented in the SSbD session, highlighting the importance of cross-sector collaboration for sustainable and circular innovation. More details on the project website.

Bodenseegespräche 2026
(01.07.2026, Hard, Austria) – V-trion

On 1 July 2026, the Smart Textiles Platform Austria participated in Bodenseegespräche VI in Hard, bringing together around 160 experts from industry, research and technology. The event provided valuable opportunities to explore connections between smart textiles, sensor technologies, robotics and advanced manufacturing, while identifying potential cooperation partners and strengthening cross-sector and cross-border networking in the D-A-CH region. More details on the project website.

Lightweight Construction exchange meeting with BMIMI
(03.08.2026, online) – BIZ-UP

During the quarterly national Lightweighting exchange meeting between BMIMI and A2LT in August, key stakeholders were brought together to exchange knowledge and align national activities. Andreas Falk (BNN) presented the current status of the ATIMA Roadmap, sparking discussions on future priorities and collaboration opportunities and strengthening coordination within Austria's lightweighting and Advanced Materials community. More details on the project website.

Werkstoff Workshop 2026
(18–19.08.2026, Graz, Austria) – ASMET

In mid-August, ASMET brought around 40 experts together in Graz for the Werkstoff Workshop 2026. The event combined an AVL site visit, expert presentations, interactive discussions and networking. ATIMA partners Gerhard Hackl and Yvonne Dworak moderated the second day, focusing on future priorities and governmental support for Advanced Materials in Austria and strengthening collaboration across the AdMa community. More details on the project website.

Role of BNN in ATIMA:

Coordination, Roadmap development, AdMa-community building, international representation, Communication & Dissemination.

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Evaluating Antimicrobial Efficacy in Biomaterials

As part of our ongoing exploration of the scientific, technical, and regulatory foundations behind the NABIHEAL project, we are pleased to present the fourth and final expert interview in our series.

In this edition, we speak with **María Luisa González Martín**, group leader at **CIBER-UEx** (Universidad de Extremadura). María Luisa and her team play a key role in evaluating the antimicrobial efficacy of the innovative biomaterials developed within the project.

The interview offers valuable insights into the importance of rigorous antimicrobial testing in the development of advanced solutions for wound care.

Her team evaluates the activity of newly developed biomaterials using in vitro models, focusing on microorganisms commonly associated with skin infections in both their planktonic form and as biofilms. Through this work, the team helps assess the potential of NABIHEAL's biomaterials to combat infection and supports the development of effective and innovative approaches for advanced wound healing.

Watch the full interview here.

Role of BNN in NABIHEAL:

SSbD concept & guidelines, Dissemination, Communication & Stakeholder Involvement.

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Outlook

BNN EVENTS & EVENTS SUPPORTED BY BNN

MILLENNIUM INNOVATION DAYS 2026

14–15 October 2026 | Lustenau, Austria

The **Millennium Innovation Days** bring together innovators, entrepreneurs, researchers, industry representatives, and other interested stakeholders for two days of insights, exchange, and networking.

The 2026 edition focuses on the topics of **Research & Innovation** and Smart **Textiles & Advanced Materials**, featuring keynote speeches, workshops, panel discussions, and networking opportunities.

TOPICS:

- **Day 1 – Advanced Materials & Research**
- **Day 2 – Innovation & Smart Textiles**

ATIMA

On the first day of the event, **ATIMA** will organize a workshop on **Advanced Materials**. The full program of the ATIMA workshop can be found via the following link.

More information here.

IMAGINE
Digitale Technologien neu denken

IMAGINE 2026 – Digital Key Technologies in Austria

22 October 2026 | Vienna, Austria

IMAGINE 2026 is Austria's flagship event for digital key technologies, organized by the Austrian Federal Ministry for Innovation, Mobility and Infrastructure (BMIMI) and the Austrian Research Promotion Agency (FFG).

The event brings together research, industry, public administration and young talents to showcase how digital key technologies—including artificial intelligence, advanced manufacturing, robotics, quantum technologies, photonics, microchips and advanced materials—can drive innovation and strengthen future ecosystems. Participants can look forward to inspiring talks, interactive sessions and valuable networking opportunities.

More information here.

SSbD26

9–11 November 2026 | Stockholm, Sweden

Following the success of the SSbD24 in Monte Verità and SSbD25 in Zurich, Switzerland, this third edition continues to bring together a growing and engaged SSbD community of researchers, industry representatives and policymakers.

The SSbD26 Conference is organized by the IRISS International SSbD Community.

More information here.

esib 2026 – The European Summit of Industrial Biotechnology

10–13 November 2026 | Graz, Austria

The European Summit of Industrial Biotechnology (esib), organized by acib GmbH, will take place from 10–13 November 2026 in Graz, Austria, together with the International Conference on Metabolic and Protein Engineering for Biosynthesis (MaPEB).

The event brings together leading experts from science, industry, and policy to discuss topics including Circular Bioeconomy and AI in Biopharmaceutical Production. The program also features workshops, a site visit, and numerous networking opportunities.

More information here.

BioNanoNet Annual Forum 2026 | FAME–Ecosys–Austria & ATIMA Event

17 November 2026 | Graz, Austria

Join us in Graz this November for the **BioNanoNet Annual Forum 2026**, held in conjunction with the **FAME-Ecosys-Austria & ATIMA Event on 17 November 2026**. The event will bring together experts, industry pioneers, researchers, and stakeholders to exchange ideas and foster new partnerships and collaborations.

Ahead of the Annual Forum, BNN will celebrate its 20th anniversary on 16 November with a festive celebration and networking evening at the BNN offices – an opportunity to reconnect, reflect on two decades of BNN, and build new connections in an informal setting.

More information here.

Zukunftstag 2026

18 November 2026 | *Graz, Austria*

The Zukunftstag 2026 brings together leaders from industry, science, and policy to explore future trends and drive innovation. With international speakers, interactive sessions, and strong networking opportunities, the event serves as a key platform for collaboration and forward-thinking ideas!

More information here.

FAME–Ecosys–Germany

9 February **2027** | *Berlin, Germany*

SAVE THE DATE

More information coming soon.

11th Conference on Applications of Femtosecond Lasers in Materials Science

22–24 February **2027** | *Mauterndorf, Austria*

A conference focused on the current status and applications of femtosecond lasers in materials science.

The event covers both fundamental aspects and a wide range of applications, including manufacturing, electronics, sensors, optoelectronics, biomedical technologies, and nanoscience.

More information here.

QSL27 – Quantum Sensing in Industry and Research 2027

20–21 April **2027** | *Linz, Austria*

Join QSL27 – The Linz Conference on Quantum Sensing in Industry and Research, bringing together leading researchers and industry experts to explore the latest advances in quantum sensing and their transition from fundamental research to real-world industrial applications.

QSL27 provides a unique platform to connect academia and industry, fostering collaboration and accelerating the development of robust quantum sensors that push beyond the limits of classical metrology.

More information here.

TechForum Millstatt 2027

30 May–02 June **2027** | *Millstatt, Austria*

SAVE THE DATE

More information coming soon.

7th European Lightweighting Network conference

02–04 June **2027** | *Aarhus, Denmark*

SAVE THE DATE

More information coming soon.

Venice Training School 2027

07–11 June **2027** | *Venice, Italy*

Following the success of our previous editions, we are thrilled to announce that the Venice Training School will return to Venice in 2027 to continue advancing the frontier of SSbD for advanced materials. Serving as a bridge between theory, policy, and real-world application, this unique event is built on the collective power of Horizon Europe funded projects, academia, industry and research initiatives working together to shape the future of responsible material design.

This edition is organized by Yordas Group, BNN, GreenDecision and Università Ca' Foscari Venezia as the leading partners, and NSC Community as the special partner.

More information here.

FEMS EUROMAT '27
19th European Congress and Exhibition on Advanced Materials and Processes

FEMS EUROMAT 2027 – European Congress on Advanced Materials and Processes

12–16 September **2027** | *Graz, Austria*

FEMS EUROMAT 2027 is one of Europe's leading events in materials science and engineering, bringing together researchers, industry professionals, and policymakers from around the world. Hosted in Graz, Austria, the congress focuses on the latest advancements in advanced materials and innovative processes shaping the future of industry and technology.

Organized by ASMET on behalf of the Federation of European Materials Societies (FEMS), the event offers a high-level platform for knowledge exchange, collaboration, and networking within the global materials community.

More information here.

Joint SSbD27 & ANTHOS'27 conference

08–10 November **2027** | *Grenoble, France*

SAVE THE DATE

More information coming soon.

ANTHOS'27
Advanced (Nano) Materials and Technologies: From Needs to Solutions

SSbD27

Finally

We hope you enjoyed reading this issue of the BNN QUARTERLY! Please feel free to share your suggestions, feedback, or ideas for future issues with us.

The next issue of the BNN QUARTERLY will be published in **December 2026** and will put the spotlight on our members and their scientific achievements throughout the year. As a special 2026 year-in-review, we will highlight outstanding research, important scientific milestones, and innovative developments from across the BioNanoNet community. The theme will be: "**BioNanoNet Members in the Spotlight: A Year Full of Innovation**".

We warmly invite BioNanoNet members to contribute to this special issue by sharing their scientific highlights from 2026, including outstanding research findings, significant project achievements, new discoveries, important publications, innovative developments, or other milestones that have advanced their field. We would also be delighted to feature broader insights into your scientific work and its impact.

Please send us your contributions by **21 November 2026** via info@bnn.at.

Articles on other topics are also welcome throughout the year and can be submitted for publication on the BNN website at any time.

Contact
info@bnn.at

Projects' Acknowledgements

The following projects have contributed to this QUARTERLY:

These projects received funding from the European Union's Horizon Europe research and innovation programme under grant n° 101293799 (**iLCA4SSbD**), n° 101092269 (**NABIHEAL**), n° 101177608 (*PLANETS*). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

The FFG is the central national funding organization and strengthens Austria's innovative power. This project is funded by the FFG, project n° FO999919580 (**ATIMA**).

PFESS is funded under the SAF€RA 2025 Joint Call. Austrian partners are funded by the Federal Ministry of Innovation, Mobility and Infrastructure (BMIMI) through the Austrian Research Promotion Agency (FFG), program nanoEHS. Funding is provided by OSALAN in Spain and INAIL in Italy. Participation of the University of Trieste and BAM is further enabled through institutional co-funding.

This paper is a result of the European SUNSHINE Horizon 2020 project (grant agreement **952924**) and SUNRISE HEU (grant agreement **101137324**). The collaboration between the partners was solidified over the three years of the project SUNSHINE and during the ongoing project SUNRISE.

This work was carried out as part of the COMET Centre InTribology (FFG no. **906860**), a project of the "Excellence Centre for Tribology" (AC2T research GmbH). InTribology is funded within the COMET – Competence Centres for Excellent Technologies Programme by the federal ministries BMIMI (former BMK) and BMWET (former BMAW) as well as the federal states of Niederösterreich and Vorarlberg based on financial support from the project partners involved. COMET is managed by The Austrian Research Promotion Agency (FFG).

Part of the BNN team – From left to right: Susanne Resch, Beatriz Alfaro Serrano, Evgenya (Jenny) Zeevi, Andreas Falk, Esther Schagen, and Christine Halbedel.

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SUSTAINABILITY LEADS THE WAY.

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