

# EUMAT Feedback to the Advanced Materials Act

## Executive summary

The **Advanced Materials Act** should establish a coherent and operational European framework that supports the entire innovation-lifecycle of advanced materials, from fundamental research to large-scale industrial deployment. A comprehensive strategic vision and opportunity roadmap is required, covering all major materials classes—including quantum materials, metamaterials, advanced composites, and neuromorphic materials—while systematically addressing barriers that hinder the translation of research outcomes into societal and economic value.

**EUMAT**, the European Advanced Materials and Technologies platform, strongly supports this ambition and proposes the following principles and priority actions to strengthen effective implementation of the Act across research, innovation, education, industry, and society.

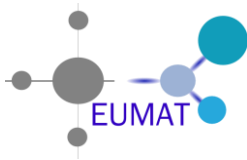
- 1. Digitalisation, artificial intelligence, FAIR data practices, and shared infrastructures** should be recognised as systemic enablers of the European advanced materials ecosystem. The Act should promote trusted and interoperable data spaces, integration of AI-driven modelling and simulation across research and manufacturing, and access to research and technological infrastructures. Controlled testing environments and regulatory sandboxes are essential to accelerate validation, certification, and standardisation, particularly for SMEs and start-ups.
- 2. The Safe and Sustainable by Design (SSbD)** framework should be embedded as a transversal requirement throughout materials discovery, development, and deployment. Early integration of safety, sustainability, circularity, and resource efficiency, supported by life-cycle environmental, cost, and social assessments, is essential to ensure responsible innovation and societal trust. SSbD should link technical development with regulation, funding, and public acceptance.
- 3.** To close the gap between research and industrial uptake, the Act should define **clear and integrated innovation pathways** spanning proof-of-concept, validation and qualification from TRL 3 onwards, scaling, manufacturing, and full supply-chain integration. Instruments such as EIC Transition, regulatory sandboxes, and public procurement of innovation should support progression to higher TRLs.



- Emphasis should be placed on materials qualification in high-value sectors where lack of validated data remains a major barrier.
4. European competitiveness and **technological sovereignty**, especially in semiconductors, AI hardware, robotics, and smart automation—depend critically on sustained investment in advanced materials. Priority areas include recycling and secondary raw materials, materials for extreme environments, resource-efficient and lightweight design, and scalable manufacturing technologies. Europe should leverage its strengths in equipment, metrology, and edge Artificial Intelligence (AI) to anchor high-value segments of global value chains.
  5. The Act should also foster a **European Advanced Materials Skills Ecosystem**, integrating transdisciplinary education, joint European degrees, micro-credentials, lifelong learning, and structured mobility across academia, RTOs, and industry. Entrepreneurship-oriented training is essential to support start-up creation and industrial uptake.
  6. A coherent **governance framework** is needed to address dual-use materials research through harmonised risk assessment, ethics review, and transparency mechanisms, while facilitating cross-fertilisation between civil and defense applications. Improved coordination between EU, national, and regional programs, potentially supported by a European observatory on advanced materials, would strengthen policy coherence.
  7. **Societal trust** and acceptance are decisive for the deployment of advanced materials. The Act should therefore systematically embed participatory approaches such as citizen panels, co-creation workshops and science communication initiatives; not least in key everyday domains (health, mobility, energy, digital technologies), integrating social sciences and humanities.
  8. Finally, optimized **funding instruments**, reduced administrative burden, and attention to territorial cohesion will ensure that the Advanced Materials Act strengthens Europe's competitiveness, sustainability, resilience, and leadership in advanced materials innovation while preventing regional disparities.

The full text of EUMAT's feedback to the Advanced Materials Act, integrating individual contributions, is described in the Annex.

EUMAT Chair, Marco Falzetti.



## ANNEX

### “EUMAT Feedback to Advanced Materials Act”

The “**Advanced Materials Act**” [document](#) must encompass a comprehensive vision and opportunity roadmap that transitions from ideas to innovation, addressing all the fields within materials science, including quantum materials, metamaterials, advanced composite materials, or neuromorphic materials. This approach effectively tackles the key challenges and barriers hindering the commercialization of materials research findings. EUMAT, the European Advanced Materials and Technologies platform, is dedicated to supporting and actively promoting this process. We emphasize the importance of fostering initiatives that facilitate this transfer. Building on the EUMAT position paper, this contribution highlights several complementary aspects that could further strengthen the implementation of the Advanced Materials Act, at the intersection between research, education, and society.

Specifically, the following activities should be prioritized:

#### 1.- Data, AI and research and technology infrastructures

- In line with the EUMAT emphasis on model-based design and federated data centres, dedicated support should be given to the development of **trusted, open and FAIR data spaces** for advanced materials, interoperable with existing European data spaces.
- The Advanced Materials Act could explicitly encourage the integration of AI-driven modelling, simulation and optimisation tools into **research, technological infrastructures**, speeding up design cycles while ensuring safety and sustainability-by-design.
- Funding schemes should promote **the shared use the infrastructures** by SMEs and start-ups, lowering access barriers and fostering cross-sectoral innovation.
- We advocate **accelerating advanced materials research** through model-based design for recycling, durability, energy efficiency, safety, and sustainability, to be implemented at early materials design stages.
- Furthermore, we support **connecting materials manufacturing and testing facilities** with data centers and artificial intelligence, while leveraging existing research and technology infrastructures in Europe.



- We strongly support the use of shared infrastructures **to reduce technological risks, particularly for SMEs**, as well as the application of digitalization and artificial intelligence tools to optimize the design and development of materials. We also consider the creation of controlled testing spaces (*sandboxes*) to accelerate validation and certification processes to be essential.
- Implementing Findable, Accessible, Interoperable, and Reusable (**FAIR**) **data practices** across all facets of EU research and innovation is important to create robust materials and material's performance databases and advanced simulation codes to ensure faster and cost-effective developments. Moreover, developing AI-driven autonomous laboratories and manufacturing hubs will revolutionize materials discovery and production processes. By prioritizing these initiatives, the EU can enhance collaboration, streamline workflows, and leverage data to unlock new opportunities in materials research, ultimately positioning itself at the forefront of technological advancement.

## 2.- Technological sovereignty and strategic autonomy

- European industrial competitiveness, **technological sovereignty and strategic autonomy** in the manufacturing of AI chips and related emerging applications, including humanoid robotics and smart industrial automation, depend critically on targeted research and innovation in advanced materials to enable key technologies for the semiconductor industry. The design and integration of advanced materials into these high-tech products are essential to reduce dependence on non-European suppliers in an era of global technological rivalry. Europe can leverage its strengths in equipment, metrology, and edge AI to anchor high-value segments of the global semiconductor industry.
- Some **hot topics** to be addressed are the following: a) facilitating recycling and consequent use of **secondary** raw materials; b) the development and deployment of **materials working in harmful and extreme environments**; c) the advanced design of materials and manufacturing technologies (eg. Additive manufacturing) to reduce the quantity of materials used, and realizing **light weight products**; d) Advocate for **scalable manufacturing infrastructures** that facilitate the transition of advanced materials from the laboratory to market.
- Facilitate the uptake of **EU research results into higher TRLs and cross-cutting applications**, improving synergies between EU, national, and



regional initiatives and funding programs. One possibility could be widening the reservoir of projects that can apply to European Innovation Council (EIC) transition funding scheme, (eg. projects funded by the member states that have reached a TRL 4, could apply to the transition EIC (TRL4-6)).

### 3.- Education, training and skills ecosystems

- Advanced materials should be embedded not only in specialised master's and doctoral programmes, but also in **transdisciplinary curricula** that connect materials science with data science, AI, design, and sustainability studies.
- European initiatives could support the creation of **Joint European Degrees and micro-credentials** in advanced materials and related enabling technologies, ensuring permeability between academic paths, vocational education, and lifelong learning.
- Structured mobility schemes (Erasmus+, Marie Skłodowska-Curie Actions, etc.) should be leveraged to build a true skills ecosystem, facilitating circulation of students, early-career researchers, engineers, and technicians across universities, RTOs and industry. **It is important in Marie Curie initiative, to make possible own country recruitments of researchers, facilitating the mobility to other countries during the project.**
- Europe needs large numbers of **well-educated and well-trained** materials experts. All initiatives for materials training, ranging from junior students to retrained materials professionals, deserve full support. Those experts need to be also educated with an **entrepreneurship mindset** to develop **more start-ups** in the advanced materials field.
- Investing in **AI and machine learning education** within the field of materials science is crucial for accelerating innovation and discovery. Likewise, we support the emphasis on circularity and specialized training, which are fundamental to closing the technical skills gap in the European Union.



#### 4.- Dual-use governance and ethical frameworks

- Building on the call for dual-use funding, the Act could include **clearer guidance on governance frameworks** for dual-use materials research, balancing competitiveness, security, and ethical responsibility.
- This might include **standardised risk assessment protocols**, ethics review procedures, and transparency requirements for projects whose outputs can be deployed in both civil and defence contexts.
- A European **observatory on dual-use advanced materials** could monitor trends, support policymakers, and provide advisory services to research organisations and companies.
- Facilitate the **exploitation and mutual exchange of advanced materials** research results originating from civil or defense applications. Funding dual-use materials research should be the rule, not the exception.

#### 5.- Integrate Safe and Sustainable by design approach

- Integrate the **Safe and Sustainable by Design (SSbD)** framework into the design and discovery processes of advanced materials, implementing FAIR data principles alongside AI-driven methodologies for materials discovery and design.
- **Sustainability and societal impact** are becoming increasingly decisive factors in the deployment of new materials and technologies, along the value chain, from starting reagents to final products. Systematic supply chain and technology assessment, life-cycle assessment including environmental, cost and social aspects, integrated with strategical and safety analysis at early development stages.

#### 6.- Societal engagement and trust

- As EUMAT notes, societal impact and sustainability are becoming decisive; this suggests systematically embedding participatory approaches (citizen panels, co-creation workshops, science communication programmes) in major advanced materials initiatives.
- Particular attention should be given to how advanced materials interact with everyday life domains (health, mobility, energy, digital devices), ensuring that benefits and potential risks are communicated clearly to non-experts.



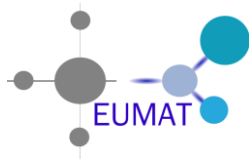
- Social sciences and humanities should be structurally integrated into large research and innovation actions on advanced materials, contributing to anticipatory governance, technology assessment and social impact analysis.
- We recommend the active **involvement of civil society** (non-experts and the wider public) in the evaluation of emerging technologies, to foster transparency and trust.

## 7.- Innovation pathways and regulatory sandboxes

- Foster **synergies between materials research and innovation pipelines** across Europe, leveraging evidence-based approaches.
- Aligned with Letta's report on single market which is fundamental to implementing the Draghi's report on competitiveness: **Simplification of EU patent applications and reduction of regulatory burdens** are widely needed.
- The Act could support "**regulatory sandboxes**" for advanced materials, where innovators, regulators and standardisation bodies test new approaches in controlled environments.
- Such sandboxes would be particularly relevant for **biomaterials, circular materials, and materials for extreme environments**, enabling faster but responsible market entry.
- In parallel, public procurement of innovation could be used to create early lead **markets for sustainable advanced materials** in areas such as construction, transport, healthcare and public infrastructures.

## 8.- Funding instruments

- As an additional contribution, to address the inefficiencies of the R&I ecosystem identified in the baseline documents, we consider it necessary to **optimize European funding instruments**. Currently, low success rates in certain calls and the high administrative burden associated with proposal preparation divert significant resources from effective innovation. In this regard, we propose promoting more agile and focused consortia, as the large number of partners in many projects makes overall work integration and monitoring difficult, diluting the impact and coherence of the results.
- Promote **projects going until, at least the qualification of materials**. Advanced materials are being used in high value industries such as



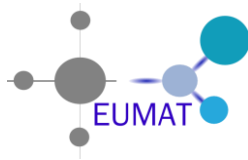
aerospace, medical devices, electronics among others. One of the main barriers for innovative advanced materials uptake is the lack of validation data according to the requirements of a specific market. The development of advanced materials needs to be done in parallel with a validation procedure from TRL 3, ensuring pertinence of the developments, shortening the time to market and costs. It is needed to include, in higher-TRL's projects (starting from TRL4) a real and complete industrial supply chain structure to improve chances of **an effective industrial uptake**.

### 9.- Territorial cohesion and regional innovation

- The implementation of the Advanced Materials Act offers a unique opportunity **to reduce regional disparities** by integrating Smart Specialisation Strategies (S3) and cohesion policy instruments with advanced materials roadmaps.
- **Targeted support for less-research-intensive regions** to access networks, data spaces, and testbeds would help prevent the emergence of a two-speed Europe in this crucial technological domain.
- Considering the geopolitical constraints that the European Union faces, it is increasingly clear that it is **important to involve regional, national hubs and innovation clusters** that facilitate collaboration and resource sharing among member states. These hubs could support the industrialization and scaling of advanced materials, as well as the efficient processing of materials and waste.
- **Policy and Governance:** As the European Union prepares for the implementation of the upcoming Advanced Materials Act, it is imperative to establish a dedicated coordination mechanism for advanced materials within the European Commission.

These elements are proposed as complementary inputs to further refine and operationalise the Advanced Materials Act, fully in line with the spirit and priorities expressed in the EUMAT feedback.

EUMAT also contributed to and fully supported the [InnoMatSyn<sup>iii</sup>](#) and the [IAM-I Position in Advanced Materials Act<sup>iv</sup>](#)



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## **References**

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<sup>i</sup> [Letta Report "Much More Than a Market" \(April 2024\) | European Research Area Platform](#)

<sup>ii</sup> [https://commission.europa.eu/topics/competitiveness/draghi-report\\_en](https://commission.europa.eu/topics/competitiveness/draghi-report_en), September 2024

<sup>iii</sup> [InnoMatSyn Consolidated Statement AdMaAct Call for Evidence-1.pdf](#)

<sup>iv</sup> [Advanced Materials Act: IAM-I position paper and call to action | IAM-I](#)