



INNOVATION IS THE KEY.  
SUSTAINABILITY LEADS THE WAY.

A silhouette of a person stands on a dark, rounded hill in the foreground. The background is a vast, dark blue night sky filled with numerous stars and the bright, glowing band of the Milky Way galaxy. The overall scene conveys a sense of wonder and exploration.

**BioNanoNet**  
**Forschungsgesellschaft**  
**mbH (BNN)**  
[www.bnn.at](http://www.bnn.at)



# The Advanced Materials ecosystem – enabling synergies with cross- sectorial collaboration

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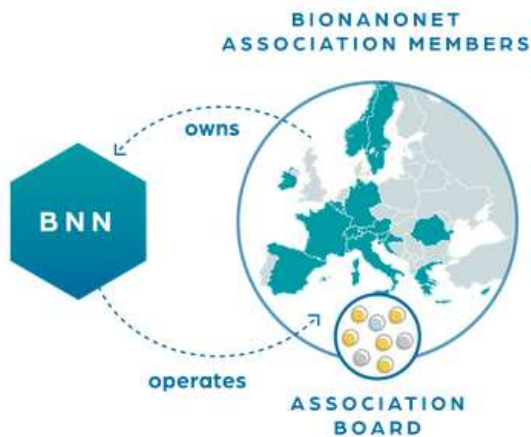
# Agenda...

## Short intro about BNN

- ✓ **From nanomaterials to Advanced materials (publication, ISO, OECD)**
  
- ✓ **AdMa-Ecosystem (national, international)**
  - ATIMA at a glance
  - From Austria to Europe
  - SSbD - a cross-link for all applications
  
- ✓ **Outlook and Conclusions**



# BNN – who we are...



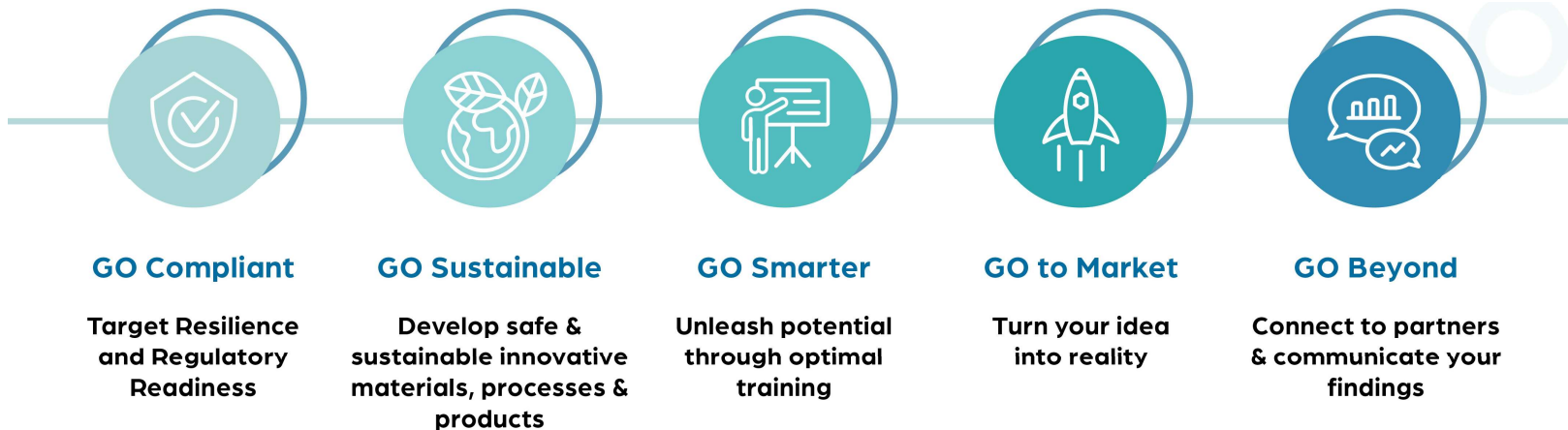
- ✓ 14 Employees
- ✓ Association >70 member organisations from 17 countries
- ✓ 3 technology platforms

SUSCHEM<sup>AT</sup>  
European Technology Platform  
For Sustainable Chemistry

Nano  
Medicine  
AUSTRIA

ADVANCED  
Microfluidics  
Initiative

## The 5 core areas of BNN:



# BNN stands for...

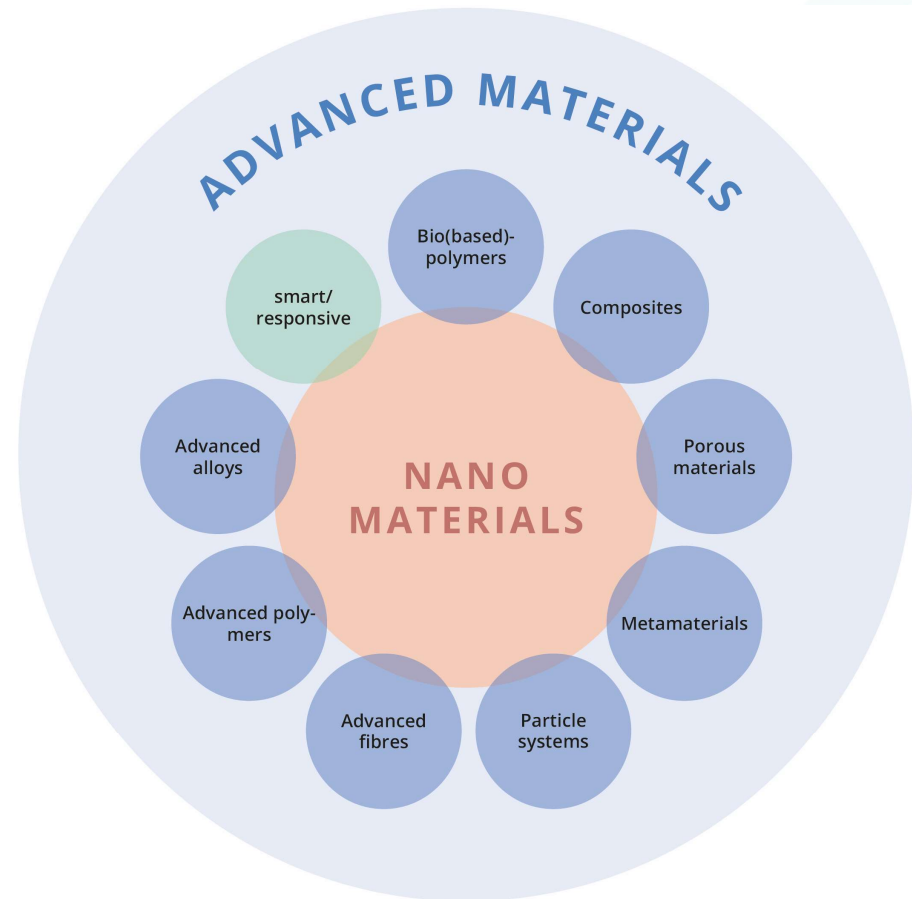
- ✓ **BNN is key stakeholder in the international ecosystem of „Advanced/Innovative Materials“**
- ✓ **BNN supports with:**
  - Advise for scientists, researchers, entrepreneurs, and public bodies
  - Innovation support at different stages of R&D&I
    - ✓ SSbD-implementation for scientists, researchers, technology developers
    - ✓ Regulatory support for SMEs
    - ✓ Valorization support for entrepreneurs
    - ✓ Competent advise for public bodies (e.g., standardisation, research development, etc.)
- ✓ **BNN creates opportunities**
  - Networking, being the interface on national level, bidirectional communication channel between regional/national to/from European/international level
  - Taking initiative, establishing communities



# From nanomaterials to Advanced materials

- ✓ “Advanced materials are **designed** to provide technological responses **superior** to those of their conventional counterparts.”
- ✓ „AdMa referring to engineered materials with **properties** purposefully controlled to produce unique **advanced behaviors**.”
- ✓ „often **nanoscale** properties that make the materials smart or advanced.”

Reference: Valsami-Jones, E., Cassee, F. R., Falk, A. (2022). **From small to clever: What does the future hold for the safety and sustainability of advanced materials?** *Nano Today*, 42, 101364. DOI: [10.1016/j.nantod.2021.101364](https://doi.org/10.1016/j.nantod.2021.101364)



# AdMa – OECD working description (1/2)

I. The **Working Party on Manufactured Nanomaterials' (WPMN) Working Description on Advanced Materials** aims to illustrate the content of the Advanced Materials playing field and the purpose of WPMN's engagement regarding these materials.

II. In this context, AdMa are understood as **materials that are rationally designed** to have

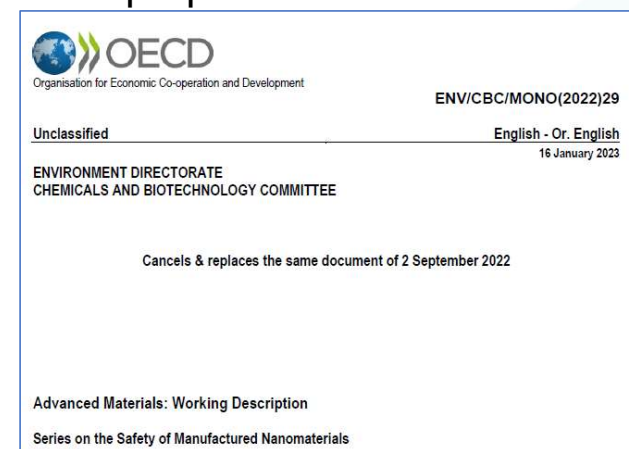
- ✓ **new or enhanced properties**, and/or
- ✓ **targeted or enhanced structural features**

with the objective **to achieve specific or improved functional performance.**

This includes both **new emerging** manufactured materials, and materials that are **manufactured from traditional** materials.

This also includes materials from **innovative manufacturing processes** that enable the creation of targeted structures from starting materials, such as bottom-up approaches. It is acknowledged that what are currently considered as AdMa will change with **time**.

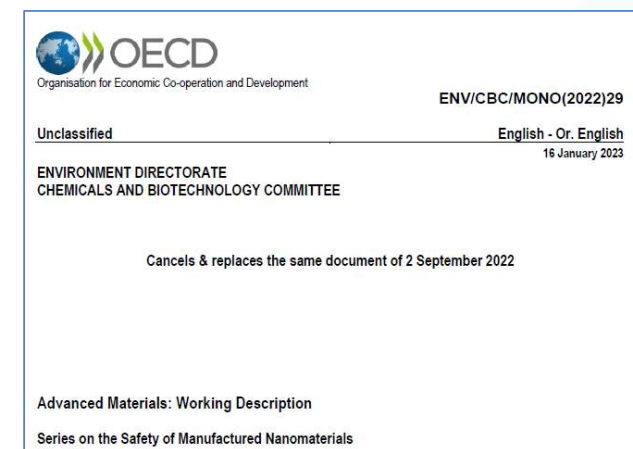
Reference: **OECD (2023)** [https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description\\_6ce97c6b/4b5ba38d-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description_6ce97c6b/4b5ba38d-en.pdf)





# AdMa – OECD working description (2/3)

III. [...] build on the knowledge gained on manufactured nanomaterials, and possibly include other **AdMa with relevance to safety, sustainability and regulatory issues** considering their whole life cycle. AdMa under consideration of WPMN are aimed **to be assessed** in order to improve their **safety, sustainability and regulatory coverage** within the strategic approach to identify knowledge gaps and recommendations for action.



Reference: OECD (2023) [https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description\\_6ce97c6b/4b5ba38d-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description_6ce97c6b/4b5ba38d-en.pdf)



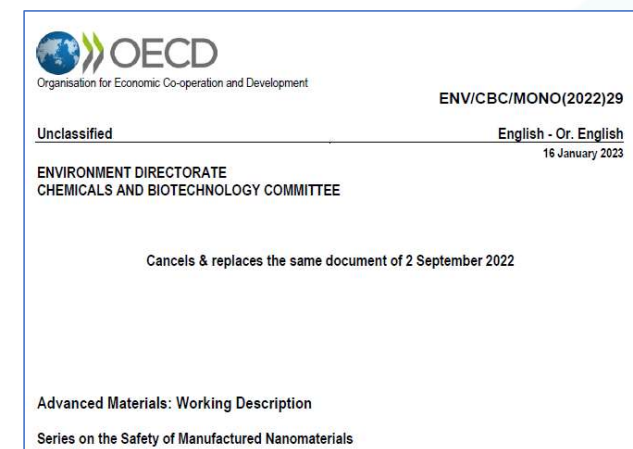


# AdMa – OECD working description (3/3)

## IV. Material Categories which are considered AdMa:

- **Biopolymers** (Materials based on naturally occurring polymers, which are designed for a specific functionality)
- **Composites** (combination of two or more materials)
- **Porous Materials** (Materials which show a porous structure, differentiated by pore size)
- **Metamaterials** (Materials with properties that go beyond the naturally occurring properties of their components)
- **Particle Systems** (Properties of the materials are related to their particles' structure)
- **Advanced Fibres** (fibres several  $\mu\text{m}$  or smaller in diameter with an intended functionality)
- **Advanced Polymers** (Polymers with an intended functionality)
- **Advanced Alloys** (intermetallic, high entropy, shape memory)
- **Smart Nanomaterials** (according to JRC definition)

Reference: OECD (2023) [https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description\\_6ce97c6b/4b5ba38d-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/advanced-materials-working-description_6ce97c6b/4b5ba38d-en.pdf)



# AdMa – ecosystem → Austria

- ✓ ATIMA – Austrian Advanced / Innovative Materials Community
- ✓ ATIMA promotes the exploration, networking, and mobilization of future-relevant materials and technologies.



**ATIMA**  
Federal Ministry  
Republic of Austria  
Climate Action, Environment,  
Energy, Mobility,  
Innovation and Technology

**FFG**  
Funded by the FFG  
(n° FO999919580).

**Mobilisation and connection of national stakeholders on the topic of 'Advanced & Innovative Materials' in Austria**



## OUR GOALS



### Strengthen the Community

We unite Austria's leading experts and organizations in advanced materials.



### Share Knowledge

We facilitate knowledge exchange within the ATIMA community as well as nationally & internationally.



### Initiate Innovation

Together with our partners, we drive forward new innovation projects.



### Identify Trends

ATIMA tracks key developments and derives actionable recommendations for research policy.



### Enhance Visibility

Through targeted initiatives, we elevate Austria's presence in the global advanced materials community.



### Support Emerging Talent

Programs like scientific conferences & early-career researcher sessions help nurture future field leaders.



Reference: [www.atima.at](http://www.atima.at)

# AdMa – ecosystem → Austria



## ATIMA – thematic fields:

- ✓ Nanomaterials
- ✓ Lightweighting materials
- ✓ Metal materials
- ✓ Functional & Smart textiles
- ✓ Materials for Additive manufacturing

## ATIMA - overarching ecosystem connection:

- ✓ AdMa-overlapping aspects



# AdMa – ecosystem – national - international



- ✓ Regional and national communities
- ✓ Thematic platforms and Associations
- ✓ IPCEI // Technology Council // IAM4EU

Selected References: [www.nsc-community.eu](http://www.nsc-community.eu) ; <https://www.iam-i.eu/>

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# BNN connects internationally...

## InnoMatSyn - Innovative Materials Ecosystem to Gain Synergies of Regional, National and EU Initiatives

- ✓ 14 beneficiaires from 11 European Countries, Coordination: BNN (Austria)
- ✓ 36 Support letters, >100 interested organisations
- ✓ 36 months, 4 Mio EUR EC-funding, start: March 1<sup>st</sup> 2025

### Goals:

- Synergetic connecting of **regional, national and European (funding)-Initiatives** (e.g.: s3, ERA.NETs, national funding bodies, partnerships, EITs, etc.) in the field of „Advanced/innovative Materials“
- Development of **Technology leakage risks assessment** Guidelines and implementation support for memberstates.
- Development of **knowledge** about competences, projects (calls, results), publications/ Materials Commons, etc., and knowledege transfer (Materials Academy)
- Development of a sustainable European Research-, Development- and Innovation-**Ecosystem** in the field of Advanced/innovative Materials



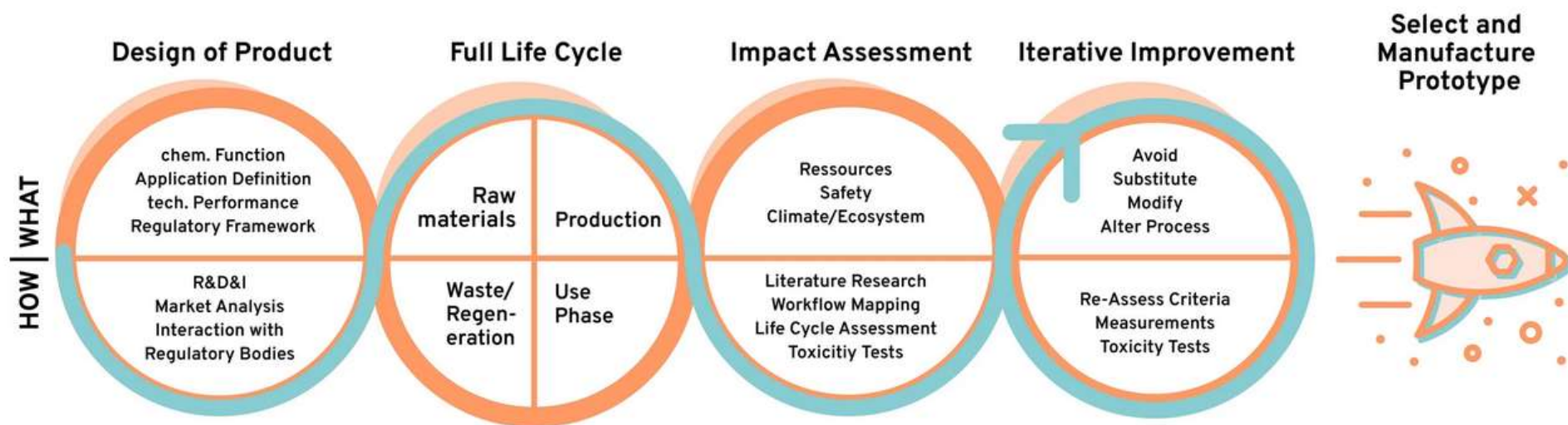




# SSbD – a cross-link in the ecosystem

## ✓ Implementing SSbD as a connection in the AdMa ecosystem...

From: [Safe-and-sustainable-by-design redox active molecules for energy storage applications](#)



Safety and sustainability as an iterative design framework. Simplified workflow for where and how Safe-and-Sustainable-by-Design during the design and innovation phase of a novel product (whether material, chemical or multicomponent product) can be applied

References: **Wolf, C., Falk A.**, et al. Safe-and-sustainable-by-design redox active molecules for energy storage applications. *Energy Sustain Soc* 15, 10 (2025). <https://doi.org/10.1186/s13705-024-00503-x>  
**SUESS-project**, <https://bnn.at/projects/> ; **HARMLESS-project**, <https://www.harmless-project.eu/>  
**Cassee F., Falk A.**, et al (2024). Roadmap safe and sustainable advanced and innovative materials. (Outlook for 2024-2030). DOI: [10.1016/j.csbj.2024.05.018](https://doi.org/10.1016/j.csbj.2024.05.018)



# Example: HARMLESS-project

**Advanced high aspect ratio & multicomponent materials: towards comprehensive intelligent testing and Safe-by-Design strategies**

✓ **Sectors:**

- Cross-sectoral use of advanced materials; case studies in agriculture, construction, manufacturing & automotive

✓ **Fields of Application (materials, products, services)**

- Imogolite multicomponent nanotubes for environmental plant protection
- Silica-based aerogels for insulation & silica additives in papermaking and paints/coatings
- Perovskites as catalysts
- Online decision support tool for advanced materials' safety & sustainability considerations in early innovation

References:

HARMLESS-project, <https://www.harmless-project.eu/>

Cassee F., Falk A., et al (2024). Roadmap safe and sustainable advanced and innovative materials. (Outlook for 2024-2030).

DOI: [10.1016/j.csbj.2024.05.018](https://doi.org/10.1016/j.csbj.2024.05.018)



# Outlook and Conclusions



- ✓ Connect to **ATIMA** → join the community!
- ✓ Implement **SSbD** to increase safety and sustainability of materials, processes and products
- ✓ Contribute to the **national strategic development** (e.g. Workshop, Interviews, Roadmap) → **March 3<sup>rd</sup> 2025, Vienna**  
<https://www.bnn.at/events/atima-ws-bnn-networking-event-2025/>
- ✓ Collaborate – **become member** of BNN association → if interested, please contact me after my talk!



# Take home messages

**BNN** is your partner...

- ✓ **to connect** on national and international level with relevant initiatives
- ✓ **to contribute** specific competences to your project/initiative e.g.:
  - the implementation of the Safety-and-Sustainability-by-Design (**SSbD**) concept;
  - **innovation** support (valorization),
  - **regulatory** support,
  - dissemination&communication and stakeholder engagement.
- ✓ **to develop** research-collaborations and/or strategic initiatives (call topics, projects, technology platforms, etc.) in specific thematic fields



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## Great thanks to my BNN – team!



## ...and thank you for your attention!



Thank  
you!