



Advanced materials for industrial leadership

NTNU – 30 October

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Overview – « zooming in »

- Advanced Materials
- Stakeholders
- Strategic agenda (research/innovation and role of industry)

Advanced materials – engine of innovation

Nobel prizes in physics, 2010

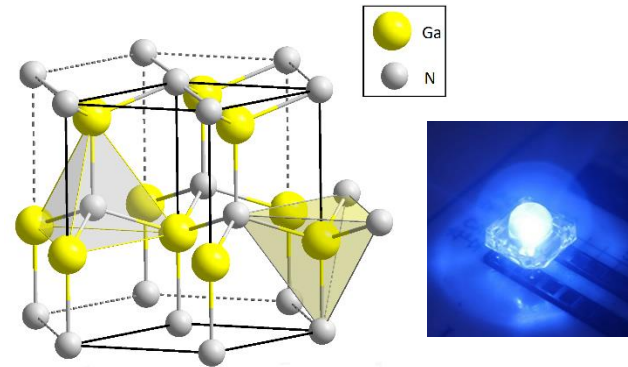


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Nobel prizes in physics, 2014



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Nobel prizes in chemistry, 2019



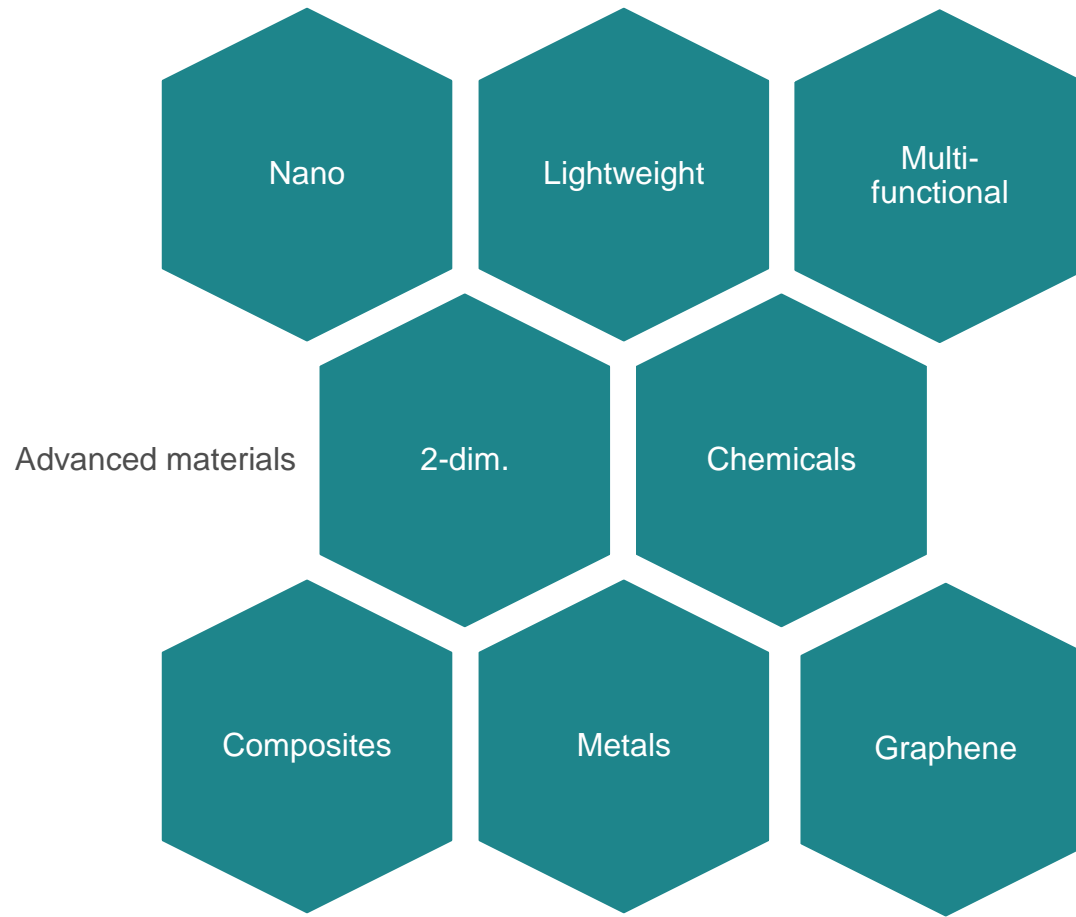
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Advanced materials - inclusive approach



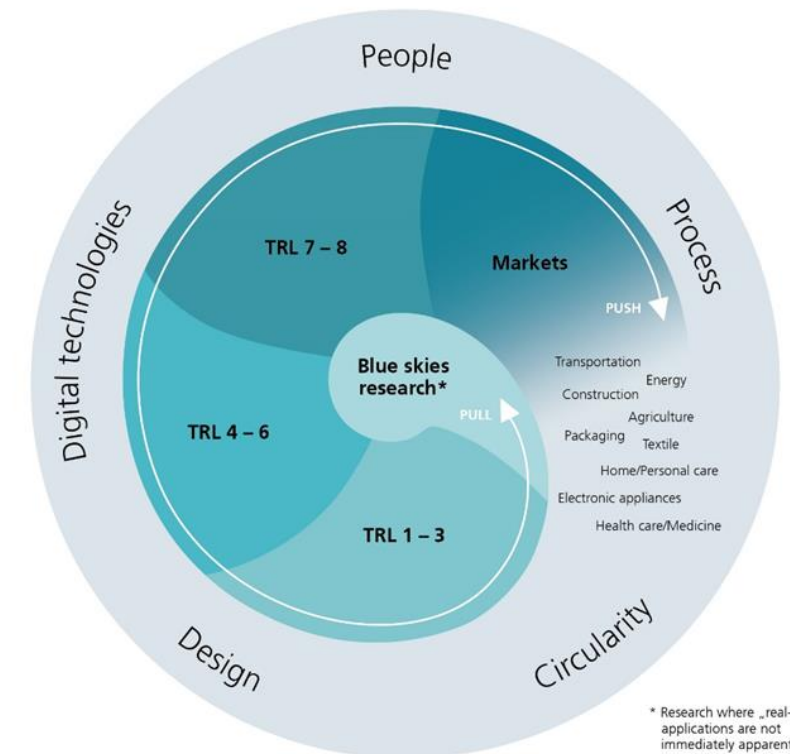
Materials 2030 Manifesto – Declaration by a few stakeholders in Feb 2022

VISION

A strong European Materials ecosystem drives the green and digital transition as well as a sustainable inclusive European society through a systemic collaboration of upstream developers, downstream users and citizens and all stakeholders in between

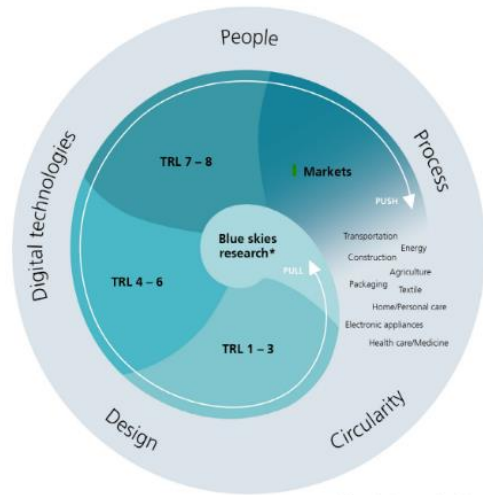
MISSION

A systemic approach is needed to develop the next generation solution-oriented advanced materials.

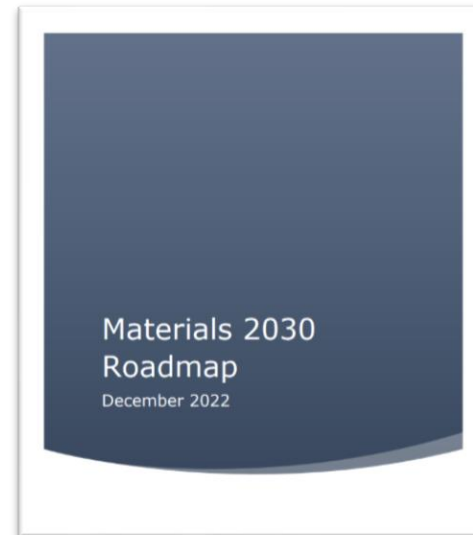


Stakeholders calling for change 2022

Materials 2030 Manifesto Feb 2022



* Research where „real-world“ applications are not immediately apparent



Commission proposal for Strategic Plan 2025-2027: Innovative Materials for EU (I'M4EU)

A new co-programmed partnership

Innovative advanced materials are engineered to have new or enhanced properties with superior performance relative to conventional (or raw) materials. They categorise as deep-tech, in line with the New European Innovation Agenda.

These materials provide for new uses essential for the green and digital transition of a resilient Europe. They include composite materials, nanomaterials and two-dimensional (2DM, one-atom thick) materials.

The partnership will focus on research, development and uptake (integration into innovative products and technologies) of a new generation of 'safe and sustainable by design' materials fit for the circular economy.

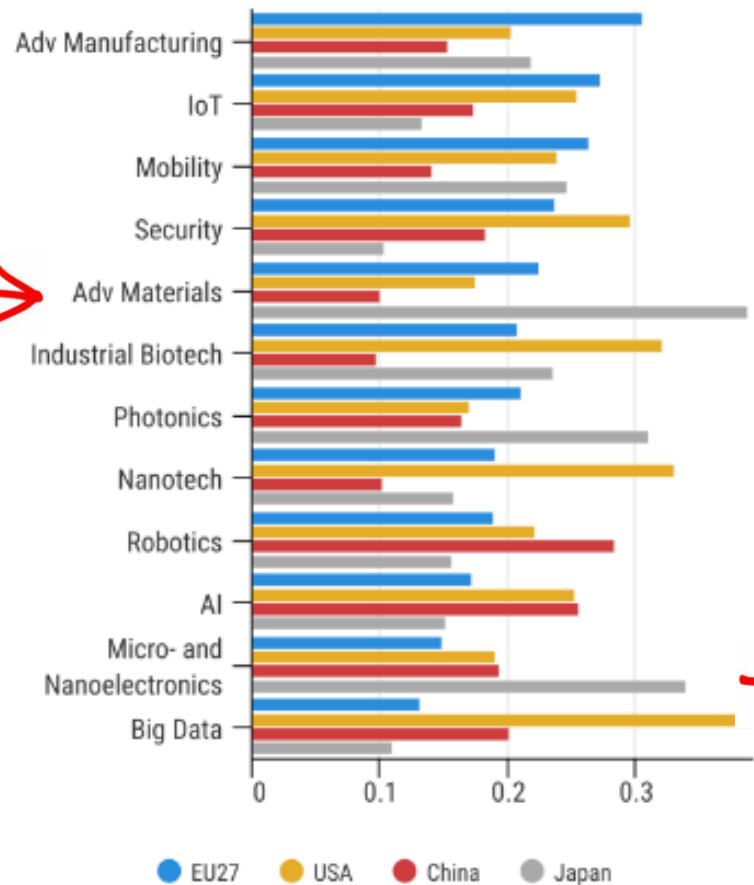
Existing networks on advanced materials in Europe – Need for inclusiveness

- AMI 2030 (launched after Materials2030 Manifesto)
- M-ERANET with national funding agencies on advanced materials (Horizon 2020 – running until 2026)
- ERANET-MIN with national funding agencies on (critical raw materials (Horizon 2020 – running until 2025)
- Graphene Flagship (Horizon 2020)
- Malta Initiative (regulatory preparedness – nanomaterials)
- European Lightweight Network
- Others



The issue of industrial leadership

Share of global patent applications, 2017



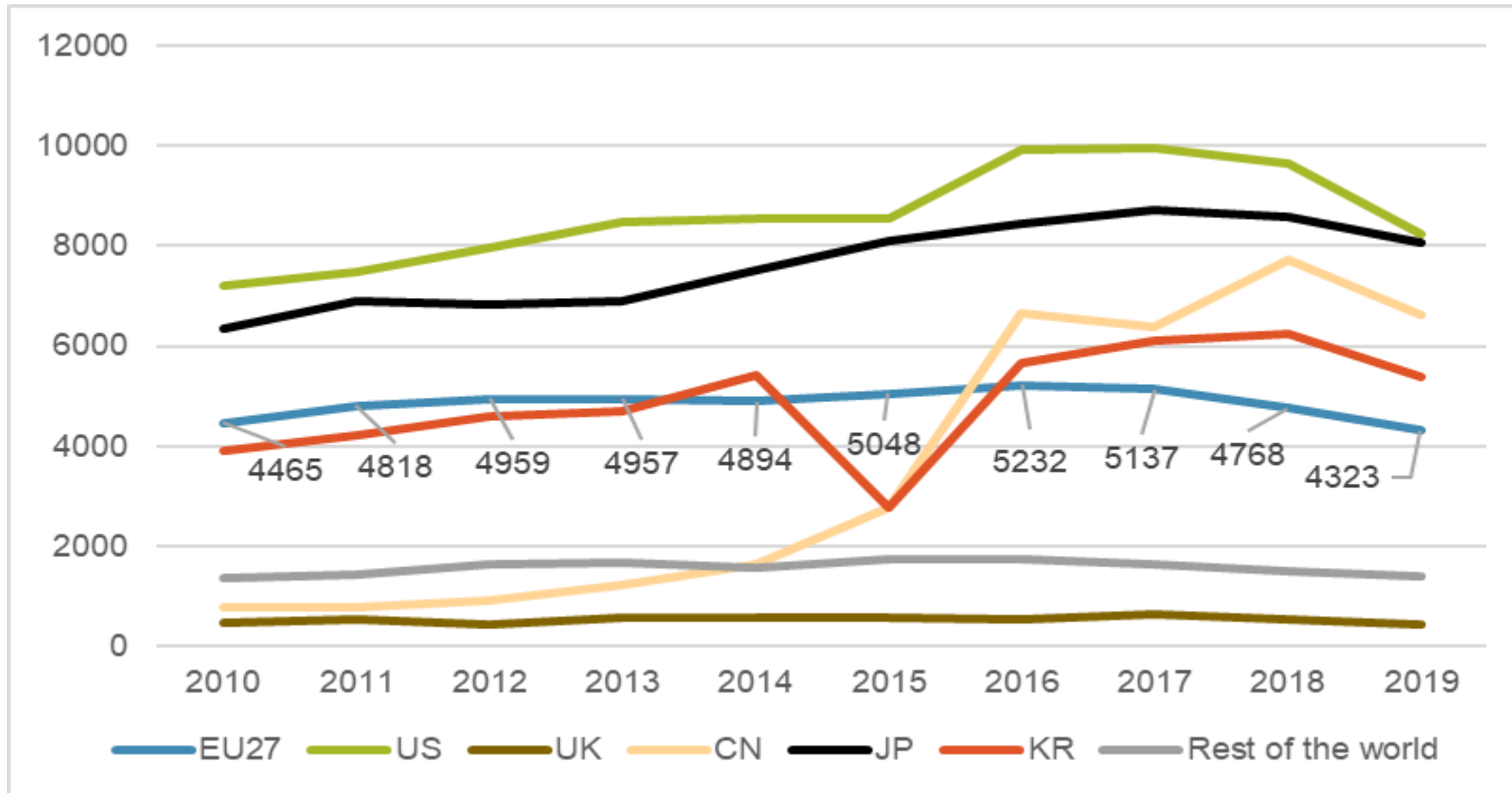
Transversal technologies	Keywords	Innovation ²	Production ³	Adoption ⁴	Average
Next-level automation	Industrial, collaborative, and professional robots; additive manufacturing; virtualization	0.6	1.0	0.7	0.8
Future of connectivity	5G, Internet of Things	0.7	0.7	0.3	0.6
Distributed infrastructure	Cloud, edge computing	0.2	0.1	0.7	0.3
Next-generation computing	Quantum computing, neuromorphic software	0.5	n/a	n/a	0.5
Applied AI	Robotic process automation, optimized decision making, natural language processing, computer vision, speech technology	0.5	<0.1	0.8	0.4
Future of programming	Software 2.0, no-code and low-code programming	0.3	<0.1	n/a	0.2
Trust architecture	Blockchain, zero-trust security/cybersecurity	0.3	0.3	0.6	0.4
Bio Revolution	Biomolecules, biosystems, bio-machine interface, biocomputing	0.8	0.4	0.5	0.6
Next-gen materials	Nanomaterials, composite materials	0.7	2.0	1.2	1.3
Future of cleantech	Solar power, wind energy, hydropower, nuclear, electric vehicles, hydrogen	1.3	0.4	1.2	1.0
Average		0.6	0.6	0.7	

Source: Technopolis Group, 2020

McKinsey Global Institute (September 2022).
 Securing Europe's competitiveness: Addressing its
 technology gap.

The issue of industrial leadership

Forthcoming study: The EU-27 owns only **15.5%** of company patents linked to AM while US (27.6%), Japan (24.2%) and South Korea (15.7%). EU stagnating



Number of AM patents by region and year

European competitive edge

	2016	2017	2018	2019	2020	2021
CN	5	6	8	10	12	15
EU-27	30	30	35	37	39	35
JP	21	20	21	23	22	16
KR	15	16	18	20	21	18
UK	13	13	14	15	15	19
US	98	88	100	113	119	133
Rest of the world	15	13	14	15	14	15

R&D investment data 2016-2021 (Orbis)

Announcement in Critical Raw Materials Act

- March 2023:
- The Critical Raw Materials Communication ([COM\(2023\)165](#)) announces that the Commission will present a **Coordinated Plan of Action with Member States on advanced materials (including on substitution)**
 - Initial focus on **research and innovation**

Advanced Materials for Industrial Leadership

KEY PRIORITIES FOR 2024

A European Green Deal

- European Wind Power Package
- 2040 climate target
- Initiative for water resilience

A Europe fit for the digital age

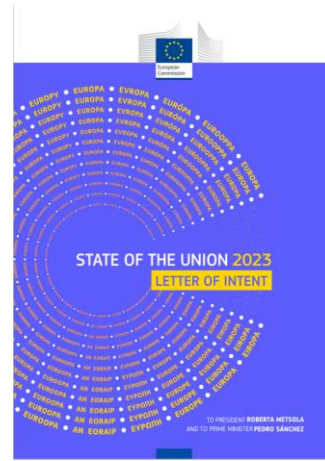
- EU Space Law
- Strategy on Space Data Economy
- Initiative to open up European supercomputer capacity to ethical and responsible AI start-ups

An Economy that Works for People

- EU Biotech and Biomanufacturing Initiative
- Follow up to the Val Duchesse Summit
- **Advanced Materials for industrial leadership**
- Initiative on rules on the European Works Council

A Stronger Europe in the world

- Strengthen partnership with Africa
- European Defence industrial strategy



Strasbourg, 17.10.2023
COM(2023) 638 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS

Commission work programme 2024

Delivering today and preparing for tomorrow

An Economy that Works for People

6.	Biotech and biomanufacturing	EU biotech and biomanufacturing initiative (non-legislative, Q1 2024)
7.	Social dialogue	Follow-up to the Val Duchesse summit (Q1/Q2 2024)
8.	Green and digital transition, open strategic autonomy	Advanced materials for industrial leadership (non-legislative, Q1 2024)
9.	European Works Council	Initiative on rules on the European Works Council (legislative or 153(2)(b), in conjunction with Article 153(1)(e) TFEU, Q1 2024, responds 'Revision of the European Works Councils Directive')



Policy Challenges for Member States and the EU

1. Industrial competitiveness

- Growing competition among leading economies for technological sovereignty under the Green Deal, for example clean tech and safe and sustainable by design chemicals and materials (Com recommendation) [Safe and sustainable by design \(europa.eu\)](https://european-council.europa.eu/media/en/press-communications/infographic/infographic_safe_and_sustainable_by_design_presentation_en.pdf)



Policy Challenges for Member States and the EU

2. Material efficiency

- Always increasing demand for materials under the Green Deal; consumers' interest into environmental footprint of future products



Overall strategic objectives

Develop a strong and inclusive materials ecosystem in Europe



**Industrial competitiveness
(twin green and digital
transition)**



**Material efficiency/circularity=
demand for materials**



**Economic security
and international
cooperation**

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