EuMaT
European Technology Platform for Advanced Engineering Materials and Technologies

Basic data
- Initiated - August 2004; official launch event - June 2006
- Status in April 2016: ~ 900 registered members
- ~ 23% from industry

EuMaT Steering Committee (40 members)

SC chairs
- D. Allen (2006-2009)
- M. Falzetti (2009-now)

EuMaT - ETP recognized by the Commission after the assessment in 2013

http://eumat.eu/
EuMaT Aims:

The primary objective of EuMaT is to define the **Strategic Research Agenda** in the area of Advanced Materials and Technologies.

Further goals and activities of EuMaT:

- **Coordination** at **European level** the Materials R&D initiatives;
- **Dialogue** between industry, R&D actors and institutions;
- **Promotion** of interdisciplinary education and training;
- Fostering **cross-sectorial contributions** of Engineering Materials and Technologies to the **grand societal challenges** of today;
- **Sustainable materials** manufacturing and recycling.
- **Impacts on public health, safety, environmental risks, and Circular Economy.**

EuMaT is open to all interested new members accepting **EuMaT goals, principles and statutes.**
Primary Objective:

The **Strategic Research Agenda (SRA)** puts together the mid- and long-term research directions and needs for Advanced Engineering Materials and Technologies, providing guidance to materials research policies of the EU.

Download at [http://eumat.eu/](http://eumat.eu/)

“Materials technology will play a major role for the European industry. It will influence the competitiveness of practically all industrial sectors.”
EuMaT: Activities

- **Leading global position** and competitiveness of the EU technology in the area of *Advanced Engineering Materials* and **consolidate an unified European policy** in this area.

- to ensure optimum **involvement of Industry** and **other important Stakeholders** in establishing **European R&D priorities**

**Development of entirely new materials** (nanomaterials, active/intelligent materials, composites, hybrid and multimaterial structures etc.) and **qualifying them for the market**.

Modification of **existing materials for new applications** (new grades of existing materials systems, new manufacturing processes).

**Innovative use of existing materials** based on good understanding of applications, material requirements and **materials degradation mechanisms**
**Alliance of Materials (A4M), EUMAT**

**EUMAT** is an original initiator of A4M.

**A4M Goal:** Integration of ETPs, and dealing with materials, all along the value chain.

**EU Network Support: CSA projects:** MatVal (FP7), and MATCH (H2020) already finished.
EuMaT Organizational Structure

Steering Committee Chairman

Secretariat

Working Groups

WG1 Modelling at Multiscale

WG2 Materials for Energy

WG3 Nanomaterials

WG4 Structural/Functional Materials

WG5 Lifecycle, Impacts and Risks

WG6 Material for ICT

WG7 Biomaterials

WG8 Raw Materials

EuMaT - horizontal Platform linked to DG Research and Innovation, Directorate D – Key Enabling Technologies, Unit D.3 – Advanced Materials and Nanotechnologies
EUMAT has set up 8 Working Groups (WG), established to cover specific fields of competences in the materials world, and to identify their challenges:

WG 1: Modelling and Multiscale
WG 2: Materials for Energy
WG 3: Nanomaterials and Nano-Assembled Materials
WG 4: Knowledge-based Structural and Functional Materials
WG 5: Life cycle, Impacts, Risks
WG 6: Materials for Information & Communication Technologies
WG 7: Biomaterials
WG 8: Raw Materials
EuMaT Working Group 1: Materials Modelling

Challenges:
To develop modern and **highly efficient simulation techniques** to design new materials, **improve** material **properties**, **optimize** and control **manufacturing processes** and to develop **new cost and environmental** efficient products. Need to develop experimental databases, **multiscale methods** and **algorithms for data mining**.

Ambition / Objectives / Mission:
To promote individual **modeling topics**, building commitment and momentum for future activities in the field of industrial technologies, reflecting the work of project clusters or networks (EMMC), cutting-edge technologies and products.

Contact: Dr. Amaya Igartua– amaya.igartua@tekniker.es
EuMaT Working Group 2:
Materials for Energy

Challenges:
Structural and functional materials for low carbon energy technologies, e.g. for dispatchable thermal power or non-dispatchable wind and solar, including materials for energy conservation, transmission and storage - to give improved performance and durability in service.

Ambition / Objectives / Mission:
To bring together expertise across the wide range of materials and energy technologies, from new concepts to performance in aggressive environments, and to provide strategic direction for the energy materials community.

Contact: Prof John Oakey – j.e.oakey@cranfield.ac.uk
EuMaT Working Group 4: Nanomaterials and Nano-structured Materials for Multifunctional Applications

Challenges:
Advancing the understanding and dissemination of **how nanoscaled materials can be assembled**, embedded to achieve novel production processes exhibiting innovative properties for health, urbanization, mobility, energy, environment and safety.

Ambition: Paving the way for the creation of a **pan-European network** of competences among all stakeholders dealing with **nanomaterials and nano-structured materials**.

Contact: lars.montelius@inl.int
EuMaT Working Group 4: Knowledge-based Structural and Functional Materials

**Challenges:** Advancing in the development of technologies for **new structural and functional materials**, which will create innovative solutions for different key industrial sectors, such as automotive, aerospace, healthcare and sustainable energy.

**Ambition:** Contributing to establishing a **synergy among all stakeholders** dealing with advanced structural and functional materials at a European scale, leading to the creation of a pan-European network of competences in the field of knowledge-based structural and functional materials.

**Contact:** Arnaldo Moreno, arnaldo.moreno@itc.uji.es
EuMaT Working Group 5: Life cycle, Impacts, Risks

**Challenges:**

- **risks in/of innovation** (e.g. risks of unexpected side-effects)
- **risk of non-performance** or performance below expectations (e.g. risks of system or component failures)
- **risk of adverse/unexpected effects** and impacts (e.g. on public health and/or environment)
- **risks over the life-cycle of products** and technologies (e.g. unexpected problems in decommissioning or recycling phase)
- **project risks**, especially in innovation, R&D and new technologies oriented projects

Analysis of the contribution of the life cycle stages to the overall environmental load to prioritize improvements on products or processes.

**Contact:** Aleksandar Jovanovic  [jovanovic@risk-technologies.com](mailto:jovanovic@risk-technologies.com)
EuMaT Working Group 6: Materials for Information and Communication Technologies (ICT)

Challenges:
The WP6 is centered on materials and nanotechnologies for ICT and autonomous devices. The aim is to develop new functional materials for Health, Transportation, ICT, Energy, Environment and Security.

Ambition:
By contributing to the best relation and dialogue between different partners (industry, academic institutions) the major technological limitations should be lifted.

Contact: cecile.autret@univ-tours.fr
EuMaT Working Group 7: Biomaterials

Challenges:
To contribute to the definition of the European research and funding strategies for increasing the competitiveness of Europe in the field of **Materials for Health**

Ambition / Objectives / Mission:
To organize a network of European competencies in the field of Materials for Health able to drive synergy in the biomedical research and industrial systems

Contact: silvia.pascale@livanova.com and enrica.verne@polito.it
EuMaT Working Group 8: Raw Materials for a Circular Economy

**Challenges:**
**Moving** from the traditional, linear ‘make, use, dispose’ economy to a circular economy, where
- the value of products and materials is maintained for as long as possible
- material & energy resources usage are minimized
- Recycling or compositing
For economic, social and environmental benefits.

**Ambition:**
Leading forum on the key role of advanced material technologies in the raw materials & circular economy domain, for the EU processing and manufacturing industries, providing market and science solutions.

Contact: Jan Meneve, jan.meneve@vito.be
“Advanced Materials are cross-sectorial ENABLERS for technology that can tackle the grand societal challenges of our time.”

<table>
<thead>
<tr>
<th>HORIZON2020 - Societal challenges</th>
<th>EuMaT activities in active working groups</th>
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<td>Health, Demographic Change and Wellbeing</td>
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<td>Food Security, Sustainable Agriculture, Forestry, Marine</td>
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<tr>
<td>Secure, Clean and Efficient Energy</td>
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<td>Smart, Green and Integrated Transport</td>
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<td>Climate Action, Environment, Resource Efficiency, Raw Materials</td>
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<td>Secure societies – Protecting freedom and security of Europe</td>
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<td>WP</td>
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<td>Modelling &amp; Characterization</td>
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<td>Nanomaterials and Nano-assembled materials</td>
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<td>Lifecycle impact and risks</td>
<td>X</td>
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<td>Materials for ICT</td>
<td>XXX</td>
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<tr>
<td>Materials for Information and Communication Technologies (ICT)</td>
<td>X</td>
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<tr>
<td>Biomaterials and biobased materials?</td>
<td>X</td>
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<tr>
<td>Raw Materials for a circular economy</td>
<td>X</td>
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<tr>
<td>In addition: Materials for additive manufacturing</td>
<td>X</td>
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</tbody>
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• Cut across many sectors

Case example: the electric vehicle
NATIONAL AND REGIONAL FUNDING PROGRAMMES DATABASE

The information about all the funding research programmes identified has been collected in a public data base accessible at the MATCH website:

http://www.match-a4m.eu/index.php/match-web-db
Number of Programms by materials
EuMaT
European Technology Platform for Advanced Engineering Materials and Technologies

National/Regional Materials Research Funding Schemes

- Self-funded National/Regional Calls: 61%
- ERA-NETS: 25%
- EUREKA / EUROSTARS: 14%

60% National-Regional vs 40% EU Coordinated
The annual Materials research national and regional public funding of most of the countries studied was found to be proportional to the national Gross Domestic Product (GDP) of the respective countries.
RELATIVE WEIGHT OF MATERIALS RESEARCH

EU* = EU-28 + CH + NO

Materials GERD

Public National/Regional Funding ≈ 2,500 M€/year
Public European Funding ≈ 1,000 M€/year
Total Public Funding ≈ 3,500 M€/year
Private Funding ≈ 7,500 M€/year
Total EU* Materials Research Funding ≈ 11,000 M€/year
GROSS DOMESTIC EXPENDITURE ON R&D (GERD)

EU* = EU-28 + CH + NO
GDP = 15,570 $10^3$ M€
GERD = 320 $10^3$ M€
R&D Intensity = 2.06%

European GERD as % of GDP (R&D Intensity)
From 1.75 to 2.06% in 10 years

R&D Intensity by public/private sectors
32% Governmental founds
## Comparing with Third Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (M€)</th>
<th>R&amp;D Intensity (%)</th>
<th>GERD (M€)</th>
<th>Materials GERD (M€)</th>
<th>Materials R&amp;D (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-28 +CH+NO</td>
<td>15,500,000</td>
<td>2.06</td>
<td>320,000</td>
<td>11,000</td>
<td>3.4</td>
</tr>
<tr>
<td>USA</td>
<td>16,000,000</td>
<td>2.72</td>
<td>440,000</td>
<td>30,000(∗)</td>
<td>6.8</td>
</tr>
<tr>
<td>JAPAN</td>
<td>4,400,000</td>
<td>3.60</td>
<td>159,000</td>
<td>8,000</td>
<td>5.0</td>
</tr>
<tr>
<td>SOUTH KOREA</td>
<td>1,300,000</td>
<td>4.29</td>
<td>54,000</td>
<td>4,000</td>
<td>7.4</td>
</tr>
</tbody>
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(∗) Includes Defence and DoE Infrastructure costs
INVITATION

A4M - MATCH
Event with the European Parliament

The role of Materials Research and Innovation for European Growth & Competitiveness
Towards a definition of the Mission concept

European Parliament ASP AGE-2
17 October – 9:00 – 11:00

Registration: ferlano@apre.it
A “Manifesto” in support of a strong Materials Research and Innovation Dimension in FP9

Why Advancing Materials are so important??

1. They are the enablers and the pillars of innovation of products and solutions for human wellbeing.

2. They are the screw to new sustainable growth for the European economy.

3. They are the nature element to boost transdisciplinary culture to the cross sectorial cooperation and citizens visibility that fill their benefit and their need;

4. They are the basis of any mission that aims to promote innovation, whatever the field considered

5. The multifunctionalities that we can exploit out of materials do serve different fields. Materials are real the metro stations that allow us to change the lines! without jeopardizing investment made, once they can serve fields with a multi attitude
What to do to keep Materials Momentum?

a) A continuous dialogue among the main organizations active, directly and indirectly, in the area of Materials R&D&I and representing at EU level academia, research organizations, industry and institutions. The philosophy of Materials Common House

b) Have an organization as A4M as system umbrella to assure the right ecosystem for achieving such structural dialogue.

c) A robust and credible European growth based on technology will never be achieved without attention to a systemic scientific and industrial investment in Advanced Materials, once they are crucial whatever the innovation we think, independent on the field considered: Energy; Technologies of Information and Communication, Health, Security; …..

d) We believe that every effort must be made to strengthen Europe’s leading position in Materials science and technology, and that resources and long terms missions must be implemented to improve the competitiveness of Europe’s advanced materials suppliers, user industries and citizens wellbeing.
Demands from A4M?

i) A4M advocate by providing the relevant data to policy makers called to decide on the future FP.

ii) To maintain a visible, strong and well oriented support to Materials R&D&I in the next EU FP as a key area for the Missions of the future.

iii) A4M can contribute for Science Regulation concerning nanomaterials/particles and nanotechnologies;

iv) To have a self-standing strong programme dedicated to Materials able to bridge the holes left on Horizon 2020 and to strength the key areas addressed there.

v) To show to policy makers that Advanced Materials are the pivotal element for Europe’s economic growth for a better quality of life development, minimizing the carbon footprint.

vi) To assure that any horizontal, interdisciplinary and multisectorial aspects of Materials R&D&I will be properly produced in Europe and used before 2030.

vii) Needs to have a central programme dedicated to Advanced Materials operating as a hub to ensure effective liaison with any Materials need from other sectorial, societal and multidisciplinary FP actions. This is the great ambition and Mission expected from the field.
Every society has been based & formed on their ability and capacity to master Materials!
For instance: Stone, Bronze, Iron Ages....!

Modern times – light alloys, composites, paper, glass, plastics, Si-chips, digital cameras etc etc

How does “innovations” appear?

Is it first a discovery phase?
Understand properties!
Realize potential!

Then followed by a technology phase?
How to fabricate?
How to utilize?

Is the discovery process “programmed”?
Discoveries in recent times!

Carbon nanotubes!
Graphene!
Uppsalite!

Electro-spinning!
Quantum Devices!
3D printing!
Imaging!

Materials & Technologies & Market!

Lars Montelius, Director General INL
www.inl.int
Everyone knows and agrees that:

Advanced Materials & KETs are needed for developing Europe!

KETs can be developed in two principal models:
  a) while being integrated in verticals
  b) in a horizontal program with focus on the enabling perspectives.

To rapidly enhance innovation capacity and secure European industrial competitiveness only one model is useful.....
To rapidly enhance innovation capacity and secure European industrial competitiveness only Horizontal model is useful!

**Horizontal model**

- Rapid and efficient diffusion of generic knowledge to many verticals secure rapid innovation & high uptake!
- Europe will be a leading actor!

**Vertical model**

- Slow Diffusion of generic knowledge between verticals lead to slow innovation & low uptake!
- Europe will lack behind!

- No generic knowledge to diffuse between verticals lead to no innovation & no uptake!
- Europe will lack behind!
THE EU-BASED INDUSTRY OF ADVANCED MATERIALS FOR CLEAN ENERGY & CLEAN MOBILITY TECHNOLOGIES IS A SOURCE OF GROWTH AND JOBS FOR EU

- But Advanced Materials display long, risky (market & technology) and capital-intensive innovation cycles that would benefit from appropriate risk-sharing at EU level

- And global trends in energy & mobility are affecting the EU-based Industry of Advanced Materials (EU policies need to take these into account appropriately)
Global trends will positively impact manufacturing cost of clean energy & clean mobility techs making it possible to manufacture in EU to serve EU market

1. East Asia’s shrinking cost advantage (Eastern Europe on the manufacturing map)
2. Advances in manufacturing technology (Industry 4.0) reducing labour & energy costs
3. More performant clean energy & clean mobility techs (leads to higher share of advanced materials in cost structure)
4. Congested maritime shipping routes leading to increase in shipping costs and risks
R&I needs to realize the EMIRI Vision for Europe

- Perform R&I to reduce intrinsic cost of advanced materials (euro/kg), improve their performance (energy unit/kg), increase lifetime and stability, ensure their competitive manufacturing & facilitate their integration into techs (several KETs are needed)

Leveraging existing EMIRI’s Strategic Innovation Agenda (EMERIT) and enabling the 4 strategic priorities of EU’s Integrated SET Plan

3 waves of R&I are needed (EMIRI-promoted “Mission” proposes to focus on first 2 waves)

- “Integration” of raw materials into Advanced Materials (intrinsic cost reduction, performance increase, lifetime & stability, resource efficient & competitive manufacturing)
- “Integration” of Advanced Materials into clean techs (effective & efficient combination of Advanced Materials, competitive manufacturing)
- “Integration” of technologies into the field (system level innovation)
• Materials supporting major EU priorities:
  • Materials for a circular economy (their design, chr
  • Materials for an Energy Union
• Improving the eco-system for discovering, assessing & testing materials' new functionalities as well as integrating materials & production/utilization.
• Materials matching citizens requirements:
  • Medical technologies/materials to increase quality, accuracy, safety & ease of use of medical technologies
  • Materials for developing easy to use final products

Hélène Chraye, Martyn Chamberlain
Travel to the Moon – Vision and Mission of Materials Experts

The experts discussed the societal challenges for a sustainable European Society in a Changing World Environment, Resource Efficiency and Secure Clean Energy:

• Health,
• Demographic Change and Well-being, Food and water security,
• Smart, Green and Integrated Transport,
• Secure Society

With a focus on understanding of which materials and processing processes would be important in order to fulfil these visions to fulfil the material´s mission.

A Document for EU Commission will be elaborated by FEMS, EUMAT with the Vision and Mission of Materials
FEMS Workshop in Lausanne, 15th November
Travel to the Moon – Vision and Mission of Materials Experts

FOOD & WATER quality
Food Quality
Smart packaging & waste
Sustainable food & water
Education

HEALTH:
Disease control
Mobility for aging population
Global supply of food.
Sensors

SMART GREEN TRANSPORT
Business models and ownership
Safety in communication.
Healthy mobility
Policy making.

SECURE SOCIETY:
Climate change
Supply chain resilience
Raw materials.
Energy

CHALLENGES
RELEVANT EVENTS after 12th May 2017

12th May, EUMAT SC Meeting EU Commission, Brussels
16th June Interplatform Event EU Commission, Brussels
3, 4th October Open Innovation Days, Brussels
5th October, EUMAT SC Meeting EU Commission, Brussels
17th October, Meeting European Parliament, Brussels
24-25th October, PV, CSP Workshop organized by EMIRI, Brussels
6th November, EMIRI Brockering Event, Brussels
7th November, EC-EDA Match-Making Event, Brussels
15th November, Lausanne Event
21st November, MATERPLAT, Spain

NEXT EVENTS 2017

22-24th November, Workshop Defense, Toledo, Spain
28-29th November, European Innovation Summit, EPPN, EMIRI
6-7th December, BBI Dissemination event
13th December, ECP4 Event, Brussels.
15th December, HPC in Materials for Energy