

Travel to the Moon – Vision and Mission of Materials Experts

FEMS Workshop on Materials R&D in the future Framework Programme FP9 of the EU Commission

15. November 2017, Lausanne

It was a sunny and cold day when 30 experts from universities, research organisations and industry met on November 15, 2017 in Lausanne, Switzerland to discuss a materials vision and mission for the next European Framework Programme 9 (FP9) (Fig 1). Invited by the FEMS (Federation of European Materials Societies) and supported by EuMaT (European Technology Platform for Advanced Engineering Materials and Technologies), by EPFL (Ecole Polytechnique Fédérale Lausanne), MatSearch Consulting Hofmann, Pully Switzerland, and IOM3 (Institute of Materials, Minerals and Mining). The experts started by discussing the societal challenges, especially four of them **Health, Demographic Change and Well-being, Food and water security, Smart, Green and Integrated Transport, Secure Society**. These topics included Transformation to a Sustainable Society/Europe in a Changing World, Environment, Resource Efficiency and Secure Clean Energy as well.



Figure 1: Participants at the workshop

The experts depicted the role that the choice of materials (raw materials), the materials development, manufacturing the recycling and re-use can play to follow a sustainable approach in a future materials mission in Europe. Having the idea of using the galaxy, Bernie Rickinson, Chief Executive of IOM3 and member of the Executive Committee of FEMS (Fig. 2) guided the four focus groups through their mission. In the galaxy, the earth acted as one of the “societal challenges”, having four planets as the main topics in these challenges. The five planets acted as the important subgroups, so that the “Travel to the Moon” could start with all kinds of expert visions for solving the societal challenges.



Figure 2: Bernie Rickinson, IOM3 and FEMS introducing the Focus Group Sessions





Figure 3 a to d: Discussions in the four Focus Groups

In a second step the participants shared their understanding about those materials and processing processes which would be important in order to fulfil these visions and to become a materials mission. These topics were always accompanied by questions on how to avoid critical materials, how to align the design to the demands of recycling, and how to produce as environmentally friendly and CO₂ neutral as possible. The focus groups (Fig. 3a to d) were also joined by PhD students and Postdocs from EPFL given their input from the view of the future generation which has to deal with the challenges.

GROUP 1: Health, Demographic Change and Well-being; *Chair: Heinrich Hofmann; Silvia Pascale*

GROUP 2: Food and water security, *Chair: Rudy Koopmans, Margarethe Hofmann*

GROUP 3: Smart, Green and Integrated Transport; *Chair: Winfried Keiper, Jose Cubillo*

GROUP 4: Secure Society *Chair: Bernie Rickinson, Roland Gauss*

Materials know how for advanced and smart materials with more and more complexity and functions using a long catalogue of elements – today some of them are highly critical – has been built up during all existing framework programmes responding to the needs for industrial innovations and of consumers and citizens. Today we will use this know-how but will combine it with the request of our citizens and politicians to address Europe’s societal challenges. Therefore, mainly materials and manufacturing methods should be developed which offer better environmental friendly conditions (CO₂ neutral), leading to easier recycling and re-use of valuable and necessary materials within Europe and at the same time enables industry to profit from the complexity of functions that the materials have.

Roland Gauss, thematic Officer at EIT (European Institute of Innovation and Technology) -Raw Materials (Fig. 4) mentioned in his presentation a case related to the magnetic materials used in motors to translate the wind energy in a windmill into electric energy. He has indicated that materials scientists and engineers can interfere at each step of the value chain, from the atomic level, design & manufacturing up to the final product to make a product more sustainable in its environment and for the citizens.



Figure 4: Roland Gauss explaining the influence of critical materials at different levels of the value chain

Nadja Adamovic, Chairperson of the European Materials Modelling Council, EMMC (Fig. 5) could show that the European Commission has followed their recommendations gathered in many workshops by some hundreds of experts in industry and academia, to use existing modelling tools and to develop new tools to follow this line of materials and manufacturing development as Roland Gauss has shown by reducing the development time and receiving information from the large scale to improve development at smaller scales. Important for all these approaches it to identify the right tools to characterize the outcome of development.



Figure 5: Nadja Adamovich, Chairwoman EMMC at her presentation

Ehrenfried Zschech, Chairperson of the European Materials Characterization Council, EMCC, and former FEMS President was not able to join the meeting but has provided the participants with the necessary information. All these initiatives have been discussed in relation to the materials mission and participants were convinced that information about these activities must be shared and ideas for projects exchanged to strengthen the synergies and avoid double work.

The participants agreed that Bernie Rickinson and Margarethe Hofmann, both members of the Executive Committee of FEMS together with EuMaT should write a joint materials mission proposal to the EU Commission within the coming weeks.

The workshop also discussed the topic of Sector Expert Groups, which was one of the main topics in the MATCH Project that the Alliance for Materials (A4M) has initiated and in which FEMS and EuMaT were important partners. Based on two workshops, initiated during the MATCH project by FEMS and organised by FEMS Past President Margarethe Hofmann and KMN-VIN's Secretary Michal Basista (European Virtual Institute on Knowledge-based Multifunctional Materials AISB), a discussion at the EuMaT Steering Committee meeting on October 5, 2017 was held. The actual EuMaT co-secretaries, Winfried Keiper and Amaya Igartua (Fig. 6) developed the proposal from this meeting further



Figure 6: Amaya Igartua and Winfried Keiper in discussion with Michal Basista, former Secretary of EuMaT

and showed it at the workshop in Lausanne. It was recommended by the workshop experts to combine the proposed the working groups of EuMaT with the societal challenges and to have in mind that the outcome of working groups as cross cutting activities should be foreseen for industrial sectors like proposed in the MATCH project (Transport, Energy, Construction, Health, Creative Industries) but also for further industrial sectors (eg. consumer goods, security) as the global needs are important for each of these sectors. Having again in mind the new FP9 Materials Mission, this group of experts would be extremely interesting in future to accompany the mission. FEMS as federation of 28 national societies in Europe and more than 20'000 professionals will further support these activities and help with information and by dissemination in the various countries.

On behalf of FEMS, Margarethe Hofmann, Immediate Past President