The history of the Federation of European Materials Societies – from the beginnings of the national materials societies to the creation of a European federation

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The European scenario: for a long time, industrial cooperation took place mainly at national level

The history of the materials societies in Europe was initially influenced by the history of the economic interests of the basic materials industries. As early as the second half of the 19th century, the steel industry in particular had recognized that, in addition to the extraction of raw materials, it was particularly the processing and testing of materials that could benefit from cooperation with the emerging polytechnic schools. The first specialist associations, later to become learned societies, such as the Iron & Steel Institute in England or the Verein Deutscher Eisenhüttenleute in Germany formed platforms for this cooperation. But it was only with the increasing expansion of technical universities and research institutes at the beginning of the 20th century that the call for cooperation became more differentiated and led to the emergence of further specific specialist societies.

The technical learned societies even felt called upon to recommend courses of study to the universities or to propose chairs, if not to endow them. In addition to the expertise of the university institutes, whose contributions were mainly fed into the expert committees, the societies also offered their members - who were in competition with each other on the market - the opportunity for informal personal contacts and often for concerted cooperation.

At that time, the close interaction between industry, universities and research funding was almost inevitably carried out on a national level. Against this background, it is not surprising that the activities of the scientific societies were largely oriented towards the domestic market until well after the end of the Second World War, after which the friend-foe scenario between the nations was repeated and only gradually diminished.

[1] Sources: fems.org, EUROMATERIALS, FEMS Newsletter; DGM-Aktuell, dgm.de,
European-mrs.com, ecers.org, epfwebsite.org; Photos 2007/2008: Marcus Krüger, Hamburg.

Development of the Learned Materials Societies in Europe

Most of the newly founded technical learned societies initially related mainly or exclusively to a single class of materials. The "M" in the name usually meant metal or metallurgy. This included non-ferrous metals such as aluminium, copper, nickel, etc. The steel industry had its own culture and usually concentrated on smelting. Among the Western European industrialized countries, the steel industry stood out in terms of size and influence:

- Verein Deutscher Eisenhüttenleute - VdEH: founded in 1860

- Institute of Metals - IOM founded in 1908, emerged from the Iron & Steel Institute, founded in 1869

- Deutsche Gesellschaft für Metallkunde - DGM: founded in 1919

- Eisenhütte Österreich: founded in 1925

- Norsk Metallurgisk Selskap - NMS: founded in 1936

- Société Française de Métallurgie - SFM: founded in 1946

- Associazione Italiana di Metallurgia - AIM: founded in 1946

Materials testing and metallography have been hot topics at all the learned societies from the very beginning. For some of them, which had been established at a very early stage, especially in the smaller European countries, testing and investigation tasks were the main activity:

- Deutscher Verband für Materialprüfung - DVM: founded in 1896

- Svenska metallografförbunde - SFMT: founded in 1922 (S)

- Schweizerischer Verband für die Materialprüfungen in der Technik - SVMT: founded in 1926 (CH)

- Bond voor Materialenkennis - BvM: founded in 1926 (NL)

From the mid-1980s onwards, the established societies began to translate the M to refer no longer only to "metal" or “metallurgy” but to "material", and they expanded their name accordingly:

- IOM3 - Institute of Materials, Minerals and Mining (formerly: IOM)

- DGM - Deutsche Gesellschaft für Materialkunde (unchanged: DGM)

- SF2M - Société Française de Métallurgie et de Matériaux (formerly: SFM)

The background was a new understanding of the tasks of the materials engineer. The focus was no longer primarily on material-compatible design, i.e. design that takes the material into account, but rather on the design-compatible material, i.e. the appropriate, best possible material for the design. Together with newly developed analysis and production methods, the challenge was now more and more to tailor the material from the ground up, without being bound by classical models. In many European countries - in both East and West - the basic training courses offered by designated materials science university institutes have provided important prerequisites for this since the 1970s.

This new thematic freedom and diversity came late, and initially caused uncertainty, especially among members of traditional societies who were mainly oriented towards structural materials. The old "alliances" were now of less and less help. Product-related objectives ("Materials for the needs of tomorrow's society") were the new requirements in national and soon also European funding programs. The new diversity urgently needed a broader technical basis, which above all included functional materials. The necessity of a closer organisational cooperation with societies of other disciplines beyond joint technical committees was obvious.

However, this step did not seem very promising against the background of very different traditions and cultures, such as, for instance, between the metal and ceramics industries. So was the forced thematic development of the individual societies beyond the old thematic boundaries the only solution? Unexpectedly, completely new options opened up.

The challenge from overseas

In the meantime, the large US materials science societies had undergone a similar development and were aiming at expanding worldwide. Many European materials scientists had already become members of TMS, ASM, ACerS or MRS during their postdoctoral studies in the USA. The fascination was great, especially because of their professionalism and degree of organisation. The perception of their offers naturally required additional efforts for the European members, such as transatlantic travel, integration in established committees, conversion of standards, etc.

Against the background of its international expansion efforts, ASM in particular took advantage of this development and began to establish branches (chapters) in several European countries. Some chapters were very successful, especially in countries where the established national societies were small (Netherlands, Switzerland, Italy) or where there were no materials societies at all (Finland, Spain). But this was only the vanguard. Finally, ASM also founded local chapters at materials science hotspots in Germany, France and England.

The materials societies in Europe noticed and became aware of the fact that serious competition was growing here, which could cost them members, especially against the background of the thematic uncertainty that had just emerged along the metals-materials line. At the same time, the classic US-American societies had also begun to move their metal basis towards materials science, as could be seen from the changed names "The Minerals, Metals and Materials Society - TMS" or "American Society of Materials - ASM".

As a consequence, in 1987, DGM (Germany), IOM (Great Britain) and SFM (France) joined forces to found a European umbrella organisation, The Federation of European Materials Societies - FEMS, in an initiative launched by DGM Managing Director Volker Schumacher and driven forward jointly with his two colleagues Bob Wood (IOM) and Yves Franchot (SFM). This did not a priori expand the portfolio of the member societies in the sense of the "new" materials science, as they all had their roots in the field of metallurgy and especially structural materials. However, the merger initially allowed them to counter the American initiatives more effectively.

On the basis of a Memorandum of Understanding agreed upon at the beginning of 1987, the founding meeting of the FEMS was held in Paris at the end of 1987 under French law on associations. Member societies from the countries of the European Community, the Council of Europe or the European Free Trade Association (EFTA) were admitted. In 1993 the FEMS moved to Brussels under association law, which required the permanent membership of a Belgian representative on the board.

At the same time, comparable umbrella organisations had been formed for the other two major materials classes, ceramics and polymers: since its foundation in 1987, the European Ceramic Society - ECerS soon developed into a professional federation with high scientific standards and well-known representatives such as Hans Hausner (Berlin), Rudi Metselaar (Eindhoven) or Richard Brook (London). It was soon able to emancipate itself from the "advances" of the American Ceramic Society - AcerS. Predecessor associations such as the Association Européenne de Céramique - AEC, which was referred to as "bricklayers" in the founding

Fig. 1: FEMS in 2008

notices of ECerS, were quickly assimilated into the European ceramic umbrella organisation. The European Polymer Federation was also founded in 1986, but it considers 1996 to be the founding year of its current structure. Both federations, ECerS and EPF, now have roughly the same number of national member societies as FEMS.

From a national point of view, did this mean that something was gained for a broader materials science claim of the national societies? Thematically, the projection of the portfolio of the national member societies onto that of their respective umbrella organisation did seem to be more or less congruent. At the European level, there even seemed to be a clearer distinction between the federations than before: During the 30 years of its existence, no initiative for cooperation between the three federations at European level was successful in the long term.

The European Materials Research Society (E-MRS) was founded in 1983 in Strasbourg, France, in the vicinity of the French CNRS by European members of the US Materials Research Society (MRS). In contrast to FEMS, it is a centrally administered European organisation based on individual membership which addresses its individual members directly. Due to its personal proximity to the EU administration, its presence in Brussels was noticed and strengthened very early on. Its Secretary General, Paul Siffert, Professor at the French CNRS, played a particularly important role here as a pioneer. Like its US role model MRS, E-MRS was from the outset primarily oriented towards *functional materials*, which meant that its coexistence with FEMS, which is primarily oriented towards *structural materials*, initially generated hardly any competition. With the increasing thematic orientation of the FEMS founders towards materials science approaches, however, overlaps inevitably occurred. In the meantime, the Director of "Technological Research" of the Directorate-General "Research and Development" - DG XII of the European Commission, Arturo Garcia Arroyo, who had recognized the complementary orientation of the two opponents, increasingly urged them to cooperate. But it was not until the mid-2000s that the first concrete attempts at rapprochement were made in the form of the European Materials Forum - EMF, initiated and promoted by DG XII, in which E-MRS and FEMS took up important positions. However, the cooperation did not become public until 2015, when the two opponents held their annual meetings, the E-MRS Fall Meeting and EUROMAT, in two consecutive weeks in Warsaw and jointly organised the "Materials Weekend" in between. The event was held under the joint patronage of the EMF and the Alliance for Materials - A4M with the aim of raising awareness of the importance of materials in Europe.

The early FEMS years

The founding president was Robert Lallemand (SFM), manager at the French nuclear energy agency CEA. The Executive Committee, as the FEMS Board is called, also included Gernot Kostorz (DGM), later Vice President, Professor at ETH Zurich, and John A. Catterall (IOM), Secretary of IOM, Paul Costa (SFM), Head of the Materials Department of ONERA, the French research centre for aviation, Torsten Ericsson (SFMT), Professor at the Swedish University of Linköping, Jean Vereecken (BM), Professor at the Free University of Brussels. The first secretary was Sir Geoffrey Ford (IOM), retired British Air Force officer and member of the IOM staff. It was agreed internally that the president and the secretary would continue to come from different European countries.

At the first general meeting in Aachen in 1989, societies from Belgium, Italy, Norway, Austria, Portugal, Sweden, Switzerland and Spain as well as the DVM from Germany joined the FEMS. Soon after the Iron Curtain had fallen in Eastern Europe, FEMS was also able to admit societies from Slovakia, the Czech Republic and Hungary. In 1993, FEMS had 14 members.

Fig. 2: Logo of FEMS since 1993; design: SF2M.

From the beginning, FEMS was financed by membership fees, which the societies paid in proportion to the number of personal members in their own country. For a long time, the fee was 2.50 € per Personal Member, in 2015 it was increased to 3 €. In 2000, with 19 member societies, the total income was about 30000 €. The largest share of this was accounted for by the memberships of IoM3, DGM, AIM, SF2M, and BvM. FEMS financed the secretariat with two thirds of the income, and about another 5000 € was spent on the travel expenses of the Executive Committee, whose members had to travel across Europe to carry out their tasks. The rest was available for honours and communication. From 2001 onwards, FEMS collected a levy from the organisers of EUROMAT meetings based on the number of participants and increased the income by 60-80% (e.g. budget 2015: 54000 €).

The work of the Executive Committee was met with great enthusiasm, especially in the early years. There was very good agreement between the members. However, international cooperation was unfamiliar to many participants, and not only because of the language. It is nevertheless true that Executive Committee members already had some experience in dealing with colleagues from other European countries, mostly through joint project work. What was new for many, however, was that within the FEMS board of directors, which represents an association of national representatives, the participants sometimes reacted with "political" resentment. In spite of all personal esteem, as a member of this committee, one believed to be subject to at least subjectively sensitive mutual control.

During the first 20 years, the balance of personnel between the member nations was maintained as agreed. In the meantime, the scope and requirements of the secretarial tasks had clearly increased including in particular much more communications tasks so that potential candidates were increasingly difficult to find. Peter Paul Schepp (1998-2003) and Paul McIntyre (2004-2009) had already significantly exceeded the planned four-year term of office as secretaries. When Hugh Dunlop (2010-2018) completed his 2 terms, FEMS created a new position, that of a communications manager, in order to lighten the load of the Executive Secretary.

The backbone of FEMS: EUROMAT conferences

The most important event of FEMS after its foundation was the first joint EUROMAT conference in Aachen, Germany, in 1989. This historical city, located very near the triple point border between Germany, Belgium and the Netherlands, was an excellent choice for the European idea. Thus, the festive event took place in the vault of the historic Kaisersaal (Fig. 3). In addition to a broad technical program, several plenary contributions were dedicated to the coordination of European research. Speakers included prominent representatives of the European Commission, such as Joseph Wurm from the Directorate "Materials Research" of DG XII, as well as major industrialists from France, England and Germany, who accepted the invitation of the organisers to assure their appreciation of the newly founded pan-European initiative.

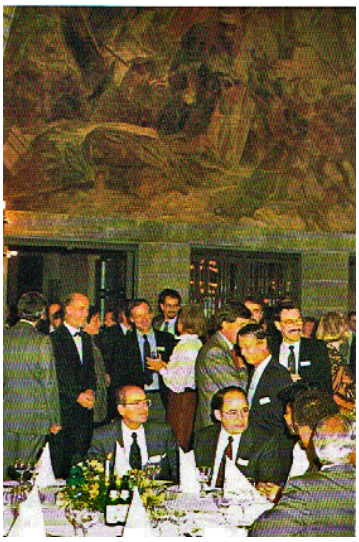

Fig. 3: EUROMAT 1989: Evening event in Aachen's coronation hall (Photo: DGM-Aktuell 1/1990).

EUROMAT 1989 was the start of a very successful series of conferences, which still today moves from member country to member country and is organised and financially managed by one (or more) FEMS member societies. For this first conference in Aachen, Volker Schumacher as conference manager and Eckart Exner as scientific conference manager spontaneously took over this tour de force on behalf of the DGM with only one year of preparation time. Schumacher also introduced the EUROMAT logo, which bears the respective year of the event and is still used today (Fig. 4). DGM Chairman Günter Petzow was able to welcome 800 participants as host at the start of the event, more than half of whom came from abroad. For the conference project this format was from now on the new challenge, where the fruits of the European networking would be recognizable.

Fig. 4: Logo of EUROMAT since 1989 (with variable event year); Design: DGM (Christoph Burkardt, Offenbach)

The successful organisation of subsequent EUROMAT conferences was not a foregone conclusion: perhaps the appeal of the new had already evaporated two years later in Cambridge, where only 400 participants registered. In the following years EUROMAT remained well below 1000 participants despite the combination with local materials events (Paris 1993: 600 participants, Padua 1995: 400 participants, Maastricht 1997: 700 participants). It was not until EUROMAT 1999 in Munich (D), under the presidency of Paul Costa (SF2M), that almost 2000 participants were reached. The programme structure for the Call has now deliberately followed the European funding programmes ("Materials for ...") and no longer succumbed to the temptation to emphasise the profile of the host country or even the venue. "Materials for communication, transport, energy or medical technology" also extended far into the field of functional and nanomaterials, thus significantly expanding the portfolio of FEMS.

The international program committee for Munich had 78 members, who came from several member countries. Without the advent of electronic media, the coordination of this extensive committee would not have been possible. At the same time, the members of the programme committee also acted very successfully as ambassadors for the event in their countries. In the end, the call generated 2350 contributions, of which about 1600 were accepted. Finally, 1950 participants came from 57 countries. The fact that the conference was accompanied by the MATERIALICA industrial exhibition of Messe München certainly contributed to its success.

The FEMS Executive Committee was very happy when several member societies applied spontaneously for the organisation of the following events. At EUROMAT 2001 in Rimini (I), however, the number of participants dropped back to 500. Lausanne 2003 (CH) followed the pattern of 1999 and, after the slump of 2001, again achieved a remarkable result with 1300 participants. Since then, the number of participants has not fallen below 1000. Three FEMS member societies were involved in Lausanne as sponsors: SVMT, SF2M and DGM. In addition, DGM had introduced its proven meeting management system, which it also used in the subsequent EUROMAT 2005 in Prague (CZ) that attracted 1500 participants. Here the Czech member societies CSNMT and MSS were co-organisers. The foreign organisational structures at the Prague Technical University and the Czech language were a great challenge for DGM in the preparation of the conference. In addition, the infrastructure in Prague was still affected by the “flood of the century”. The brilliant September weather during the conference made some shortcomings forgotten. EUROMAT 2007 in Nuremberg (D) was a home game for

Fig. 5: EUROMAT 2007: Opening in the plenary hall of the Congress Centre of the Nuremberg Exhibition Centre with the lecture by Subra Surresh, the European Materials Prize winner that year.

DGM in every respect. It was able to offer 18 parallel sessions in the conference building of the Nuremberg Exhibition Centre for over 2500 lecture registrations and over 2000 participants. The lecture by the winner of the European Materials Medal, Subra Surresh from MIT, at the start of the conference in a packed plenary hall with 1200 listeners, in front of three screens gave those present a sublime feeling (Fig. 5).

In the exhibition Poland presented itself as a guest country with an official celebration, to which the Consul General from Munich travelled especially for this occasion. Nuremberg 2007 under the presidency of Robert Singer (DGM) was the greatest success of all the EUROMAT conferences held up until that time.

This created a standard that was accepted for the following EUROMAT events and continued to be very successful. With the exception of Glasgow 2009 (UK) and Warsaw 2015 (PL), the number of visitors always exceeded the 2000 mark: Montpellier (F) in 2011, Seville (E) in 2013 and Thessaloniki (GR) in 2017. EUROMAT 2013 in Seville under the presidency of Ehrenfried Zschech (DGM) with Frank Mücklich (DGM) as scientific conference manager and Paloma Fernandez Sanchez (SOCIEMAT) as manager for the first time integrated not only technical topics but also symposia on technology transfer, in which representatives of the European Commission also took part. In Warsaw (PL), EUROMAT and the E-MRS autumn conference took place in two consecutive weeks. On the intervening "Materials Weekend", a joint programme was organised by the associations under the auspices of the European Materials Forum - EMF and the Alliance for Materials - A4M. It included a high-profile panel discussion on "Materials for Europe" with Clara de la Torre, Director "Key Technologies" of the Directorate-General "Research and Innovation" of the European Commission. A two-day workshop for young scientists was accompanied by an evening event at the French and German embassies. The population of Warsaw was offered a "Festival of Science". However, the numbers of participants (1300) at EUROMAT 2015 was relatively low. A joint weekly scientific programme of the two major associations, FEMS and E-MRS, would certainly have brought the event a record number of participants, since nearly 1500 delegates attended the E-MRS fall meeting. The anticipated little overlap of the audience of the two meetings, and with this the complementary membership of the two societies could thus have been convincingly demonstrated. In Greece 2017, Anna Zervaki (HMS) as head of the Management Committee and Panos Tsakiropoulos (HMS) and Anke Kaysser-Pyzalla (DGM), who shared the leadership of the Scientific Committee, were able to exceed all previous EUROMAT meetings with 2,726 registered contributions and 2,300 participants. Obviously, FEMS has recently been able to recruit women for important management tasks. Stockholm (S) was chosen as the venue for 2019 (2085 delegates). The Austrian society ASMET qualified for organising EUROMAT 2021 in Graz (A).

An international conference for young researchers: Junior EUROMAT

In the intermediate years of the EUROMAT Roadmap, the FEMS initially offered the monothematic "EUROMAT Topical" series: Genoa (I) 1992, Balatonszéplak (HU) 1994, Bournemouth (UK) 1996, Lisbon (P) 1998, Tours (F) 2000 and London (UK) 2002.

The other early conference event organised by FEMS, Junior EUROMAT, was an initiative of the DGM, which it organised and financed under the direction of Peter Paul Schepp (until 2008) at the Ecole Polytechnique Fédérale de Lausanne - EPFL, Switzerland, every two years from 1992 to 2014 for young European researchers. Junior EUROMAT is aimed at diploma and doctoral students to present their academic work at the conference in the form of short lectures or posters (Fig. 6). It also provides a favoured orientation platform for representatives from industry, which was particularly welcome in the period from around 1998 to 2004 when the number of engineering graduates of most western European universities had gone down enormously. For many participants, Junior EUROMAT is often the first opportunity for an international conference presentation. In the early years, the low fees made it possible for students from countries with minor

purchasing power to participate at an early stage in their careers. The DGM did not cover its personnel costs, and the two Lausanne universities EPFL and UNIL also generously provided the meeting rooms and infrastructure on their joint campus. The civil army shelter in the neighbouring village provided low cost accommodation for more than 100 participants. Most students will have fond memories of their encounters with fellow students from many nations, especially during the evenings on the shores of Lake Geneva (Fig. 7).

After the DGM had completed the series on its own, the Junior EUROMAT 2016 took place once again in Lausanne, organised by a team led by FEMS President Margarethe Hofmann (SVMT), who was at home in Lausanne. Since 2018, Junior EUROMAT has started to travel through the FEMS member countries, much like its big sister EUROMAT. The new selection procedure determined that Budapest (HU) would be the first venue in 2018, to be followed by Granada (E) in 2020.

Fig. 6: Junior EUROMAT 2008 poster presentations with international participation

Fig. 7: Junior EUROMAT 2008: Summer party on the shores of Lake Geneva.

The "Face of FEMS"

As early as 1991, Peter Paul Schepp (DGM) published the four-page "FEMS news" for FEMS at irregular intervals (Fig. 8). In 1994 it was taken up and supplemented by "EUROMATERIALS", a 28-page members' magazine. It was edited and published by the Wissenschaftsverlag VCH (from 1998: Wiley-VCH) in Weinheim (D) and appeared in 4 free issues per year with a circulation of about 20000, which the publishing house financed with its own advertising pages. The FEMS member societies were responsible for the distribution.

EUROMATERIALS provided a stage for the FEMS managers as well as the member societies in the widely ramified catchment area of FEMS. The FEMS news of the predecessor journal was extended by EU news, general news from the professional scene and a materials calendar with events from the worldwide professional community, which offered a welcome orientation aid in pre-Internet times.

The contract with Wiley-VCH was not renewed after 8 years, the last issue was published in December 2001, in which the then President Donato Firrao (AIM) called EUROMATERIALS "the face of FEMS", but at the same time noted: "Many news items reach the reader too late. Information about the EU administration is also available elsewhere. Should EUROMATERIALS not publish research results instead?" After the publisher announced that this could no longer be done free of charge, it was clear that FEMS could not afford this for 20000 recipients. Since 2002, FEMS has published an electronic FEMS newsletter once to four times a year with an increased content of up to 12 pages. In 2019 an agreement was struck with the publisher Taylor & Francis to launch a new open-access journal, ***European Journal of Materials.*** EJM will publish high-quality research across the entire discipline of materials science and technology.

The first efforts to develop a FEMS website started at about the turn of the century. Most of the member societies were still busy with the introduction of the new internet medium themselves, so FEMS gladly took advantage of an offer from the University of Cambridge. Bill Clyne (IOM3) in collaboration with his IT specialist, Dave Hudson, managed to build up a reasonable basis by 2004 (www.fems.org). In 2012, Ehrenfried Zschech (DGM) gave the website a good facelift. In 2017 it was completely redesigned under the direction of Hugh Dunlop in cooperation with IOM3, just in time for the 30th anniversary.

Fig 8: FEMS Newsletters over time. Left: the first news sheet published by DGM in 1991 (4p); 2nd from left: newsletters were included in the Euromaterials Magazine (Wiley VCH) between 1994 and 2001 (24p); 3rd from left: the newsletter reverted to a standalone format in 2002; right: current format since 2012 (up to 12p).

FEMS develops into being a European partner

Soon after the Treaty of Maastricht (1992), FEMS via DGM applied for funding from the European Union for the first time with the project "Establishing a Materials Science Education Network". The "training triangle", a "ternary state diagram" of the very complex materials science education scene, which the DGM had set up for German universities in 1992, was the starting point. This provided information about curricula and degrees in materials science in other Western European countries to be compiled at a very early stage according to uniform criteria. EU funding was supplied within the framework of the "Human Capital and Mobility" programme (1992-1996), which was extended to Central and Eastern European countries from 1995 through the PECO supplementary programme, even if they were not yet members of the EU. The overall coordinator

was Peter Paul Schepp (DGM). In this early joint project, the path was almost more important than the goal: Through the project network, FEMS gained reliable contacts to competent partners in 25 European countries.

After the turn of the millennium, FEMS was again seeking a basis for cooperation with E-MRS. Many approaches had failed. The EU Commission, which was more interested than ever in cooperation between the two large supranational materials institutions, immediately approved an application for funding for the MatNet project. Like the previous education project, MatNet had a structural background. It was about harmonizing the personal databases of the individual societies with the aim of being able to help each other more easily and quickly in identifying experts. For this purpose, a generally accessible thesaurus was to be set up, according to which the databases of all participating societies were to be structured without having to disclose the database contents - an everyday exercise for today's database strategists in the marketing departments of mail order companies. It soon became clear that the task was too complex for the given time and financial framework and was technically far ahead of its time. But again, the project work brought the actors closer together, this time mainly FEMS and E-MRS.

In 2005 this experience led to the formation of the European Materials Forum - EMF, a non-profit umbrella organisation for all public and private actors in the field of materials science and engineering in Europe. Founder members were FEMS and E-MRS, the European Science Foundation - ESF, the European Physical Society - EPS, Euroscience, the European Consortium for Biomaterials and Health Care - EUROBIOMATEX. Strasbourg became the headquarters of the organisation.

With this broad interdisciplinary basis, the EMF could hope to be even more welcome at the EU Commission. Already in 2006, a delegation was received in Strasbourg (F) by the Research Council of the European Parliament and in Brussels by the Commissioner for Science and Research Janez Potocnik. During the expansion phase - under the FEMS presidency of Wilfried Kurz and Robert Singer - there were many activities to stabilize and broaden the structure. One even thought of international networking, extending to the Far East.

During his presidency, Ehrenfried Zschech (DGM) arranged numerous European initiatives together with the president of the E-MRS, Rodrigo Martins. The forum "Materials for the 2020 Challenges" organised in July 2012 re-established contact with the European Parliament in Strasbourg. The signing of the "Aarhus Declaration" at the Industrial Technology Conference 2012 in Aarhus (DK) by Herbert von Bose, Director "Industrial Technologies" of the Directorate-General "Research and Innovation" of the EU Commission, Marco Falzetti, Chairman of the European Materials and Technology Platform EuMaT, Rodrigo Martins, President of E-MRS, and Ehrenfried Zschech, President of FEMS, was a far-reaching milestone for the joint shaping of activities (Fig. 9). In the following years it was coordinated with the Alliance for Materials - A4M. Herbert von Bose placed great hope in this cooperation for the development of an "improved strategic partnership" to strengthen the competitiveness of the European industry.

Fig. 9: Aarhus Declaration - during the signing ceremony (from left to right): Rodrigo Martins, President E-MRS, Ehrenfried Zschech, President FEMS, Marco Falzetti, Chairman EuMaT, Herbert von Bose, Director: Industrial Technologies at the Directorate General: Research and Innovation of the European Commission.

Margarethe Hofmann (SVMT), who later became FEMS President, played a decisive role in two new European projects: The MatVal project (2012-2014) was based on the requirement that materials research and development would become an integral part of the entire value added chain. Its particular aim was to demonstrate that by taking the whole range of materials technologies into account their broad industrial utilization could be accelerated. The follow-up project, MATCH (2015-2017), aimed at further strengthening a sustainable integrated network in which all European actors are involved. FEMS' involvement in these two projects led to increased cooperation with the European Materials and Technology Platform EuMaT. This body produces analyses of current developments in materials technologies and submits proposals with recommendations for action to the European Commission.

Fig. 10: FEMS member societies in 2015.

Another important area is the training in the field of materials and technologies. Since 2012, so-called European Advanced Training Courses supported by FEMS have been offered - so far in Germany, Poland and Switzerland. The DGM advanced training course "Nanoscale Materials" organised in Dresden is held annually. There is every indication that with this instrument FEMS could exploit an even greater potential.

Over the last six years, the strategy of FEMS has been progressively defined in longer-term objectives, with the initiative of Brett Suddell (IOM3), as vice-president, then as FEMS president (2016-2017), to draw up 5-year strategic plans and to publicise the benefits offered by FEMS. In the interests of quality assurance, clearer guidelines for the awarding of contracts for the EUROMAT and Junior EUROMAT conferences were drawn up by the Executive Secretary and a FEMS working group. The statutes have also been revised and the "Associate Member" category for specialist individual organisations and institutions from the early days of FEMS has been reinitiated. The Swiss foundation "Entwicklungsfonds Seltene Metalle" (ESM) became an associate member and was already able to contribute to the new topic area "Resources, Life Cycle Assessment and Closed Substance Cycle Waste Management" at EUROMAT 2017. GRANTA Design, the English service provider for materials information technology, qualified as a further associate member in 2018.

Materials science and engineering are now facing new challenges in relation to the major social tasks in the fields of energy, transport, health, information technology and architecture. In the meantime, FEMS with its 24 professional societies has come a long way with regard to these new tasks and is recognised and sought after as a competent partner in Europe.

Tables retracing the history of FEMS

FEMS member societies:

AUSTRIA	ASMET - The Austrian Society for Metallurgy and Materials
CZECH REPUBLIC	CSNMT - Czech Society for New Materials and Technologies
FRANCE	SF2M - Société Française de Métallurgie et des Matériaux
GERMANY	DGM - Deutsche Gesellschaft für Materialkunde
GERMANY	DVM - Deutscher Verband für Materialforschung und -prüfung e.V.
GREECE	HMS - Hellenic Metallurgical Society
GREECE	HSSTCM - Hellenic Society for the Science and Technology of Condensed Matter
HUNGARY	MAE - Hungarian Society of Materials Science
ITALY	AIM - Associazione Italiana di Metallurgia
ITALY	ASSOCOMPOSITI - Italian Industry Association for Composite Materials
LATVIA	LMRS - Latvian Materials Research Society
LITHUANIA	LtMRS - Lithuanian Materials Research Society
NETHERLANDS	BvM - Bond voor Materialenkennis / Society for Materials Knowledge
NORWAY	NMS- Norsk Materialteknisk Selskap
POLAND	PTM - Polish Materials Science Society
PORTUGAL	SPM - Sociedade Portuguesa de Materiais
SERBIA	Materials Research Society of Serbia
SLOVAKIA	SNMTS - Society for New Materials and Technologies in Slovakia
SLOVENIA	SDM - Slovenian Society of Materials
SPAIN	SOCIEMAT - Sociedad Española de Materiales
SWEDEN	SFMT - The Swedish Society for Materials Technology
SWITZERLAND	SVMT - Schweizerischer Verband für Materialwissenschaft und Technologie
UNITED KINGDOM	IOM3 - Institute of Materials, Minerals & Mining

Fig 11: Current FEMS Member Society logos.

FEMS - Presidents
Robert Lallemand (SFM) 1987-1991
Gernot Kostorz (DGM) 1992-1993
Ray Smallman (IOM) 1994-1995
Jean Vereecken (BM) 1996-1997
Paul Costa (SF2M) 1998-1999
Donato Firrao (AIM) 2000-2001
Alan Morell (IOM3) 2002-2003
Wilfried Kurz (SVMT) 2004-2005
Robert Singer (DGM) 2006-2007
Bill Clyne (IOM3) 2008-2009
Pedro Dolabella Portella (DVM) 2010-2011
Ehrenfried Zschech (DGM) 2012-2013
Margarethe Hofmann (SVMT) 2014-2015
Brett Suddell (IOM3) 2016-2017
Paloma Fernandez Sanchez (SOCIEMAT) 2018-2019
Eric Le Bourhis (SF2M) 2020-2021

FEMS - Secretaries
Sir Geoffrey Ford (IOM): 1987-1992
Jean Morlet (SF2M): 1993-1994
Claude Beernaert (SF2M): 1995-1997
Peter Paul Schepp (DGM): 1998-2003
Paul McIntyre (IOM3): 2004-2009
Hugh Dunlop (SF2M): 2010-2018
Efi Fragkou (IOM3): 2018-present

FEMS – Communications Manager
Hugh Dunlop (SF2M): 2018-present

EUROMAT meetings (number of participants)
1989: Aachen (700)
1991: Cambridge (400)
1993: Paris (500)
1995: Padua (400)
1997: Maastricht (600)
1999: Munich (1900)
2001: Rimini (500)
2003: Lausanne (1200)
2005: Prague (1500)
2007: Nuremberg (2100)
2009: Glasgow (1200)
2011: Montpellier (2000)
2013: Seville (2200)
2015: Warsaw (1300)
2017: Thessaloniki (2300)
2019: Stockholm (2085)

FEMS-Awards

The EUROPEAN MATERIALS MEDAL for outstanding contributions to materials science and materials engineering has been awarded 13 times since 1993.

EUROPEAN MATERIALS MEDAL Award winners:
2019 Ehrenfried **Zschech**, Dresden, D
2017 Doros N. **Theodorou**, Athens, Gr
2015 Krzysztof J. **Kurzydłowski**, Warsaw, Pl
2013 Michel **Rappaz**, Lausanne, CH
2011 Günter **Gottstein**, Aachen, D
2009 Ludwig **Schultz**, Dresden, D
2007 Subra **Suresh**, Cambridge, MA, USA
2005 Jeff T. M. **de Hosson**, Groningen, NL
2003 Gerhard **Wegner**, Mainz, D
2001 Colin J. **Humphreys**, Cambridge, UK
1999 Wilfried **Kurz**, Lausanne, CH
1997 André **Pineau**, Evry, F
1995 Herbert **Gleiter**, Karlsruhe, D
1993 Michael F. **Ashby**, Cambridge, UK

The MATERIALS SCIENCE AND TECHNOLOGY PRIZE has been awarded to young materials scientists since 1995. It initially consisted of the 20-volume materials compendium of the same name, which was donated by the publishing house Wiley-VCH. Later, the publishing house Taylor & Francis took over the foundation of the prize.

Since 2011, the MATERIALS INNOVATION MEDAL will be awarded primarily to engineers for outstanding inventions in the field of materials science and materials technology that have a direct impact on society and the environment.

The Honorary Membership for outstanding services to society was created very early on. In 1992 the first Secretary of FEMS, Sir Geoffrey Ford, was awarded the first honorary membership. Since then, 10 more "officers" of FEMS have received honorary membership.

Acronyms of other organisations

A4M	Alliance for Materials
CNRS	Centre National de la Recherche Scientifique
ECerS	European Ceramic Society
EMF	European Materials Forum
EuMaT	European Technology Platform for Advanced Engineering Materials and Technologies
EPF	European Polymer Federation
ESF	European Science Foundation
EPS	European Physical Society
BM	Bénélux Métallurgie (dissolved Belgian FEMS society)
MSS	Metals Science Society (former Czech FEMS member society)
OMBKE	Orzagos Magyar Banyaszati es Kohaszati Egyesület (former Hungarian FEMS member society)