

KMM-VIN Newsletter

Issue 6, July 2012



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EDITORIAL

We are presenting the sixth Issue of the Newsletter of the European Virtual Institute on Knowledge-based Multifunctional Materials (KMM-VIN). The Newsletter is published twice a year, as Summer (July) and Winter (December) Issues.

The Institute was established in 2007 as the main result of the Network of Excellence KMM-NoE (FP6). The legal status of KMM-VIN is that of Belgian international non-profit association (AISBL). KMM-VIN AISBL is registered in Brussels and comprises currently 62 core and associated member institutions (research centres, universities, industry and SMEs) from 15 European States and 4 individual members.

For its members KMM-VIN is providing an organizational framework to conduct jointly basic and applied research comprising materials processing, characterisation and modelling. For external clients KMM-VIN is offering integrated R&D, educational and innovation activities in the field of advanced structural and functional materials with main focus on Transport, Energy and Biomedical sectors of European industry.

The Summer Issue 2012 of the Newsletter contains the usual columns and a new one: "*Partner Search for Project Proposals*". This issue commences, as usual, with "*Latest News*" headed by the report from the 7th KMM-VIN General Assembly (Annual GA Meeting 2012). This event seems to have opened a new chapter in KMM-VIN activity. Expansion of the KMM-VIN partnership by inclusion of a number of new members, mainly from the former COST project dealing with high temperature steels, have resulted in a substantial enrichment of KMM-VIN expertise and infrastructure potential. Moreover, substantial changes in organization of KMM-VIN Working Groups were approved. The old materials-oriented KMM-VIN structure has been replaced by a new one oriented toward the target customers. The following four groups have been created: WG1. Materials for Transport, WG2. Materials for Energy, WG3. Biomaterials and WG4. Modelling (horizontal group). Motivation for such structure is given

in more detail in the column "*What's New in Working Groups?*", which is the most important part of each KMM-VIN Newsletter.

In the column "KMM Projects" you can find information from the European projects and selected national projects where KMM-VIN members are involved in. Special attention is given to the two running FP7 projects coordinated by KMM-VIN, namely MATRANS ("Micro and Nanocrystalline Functionally Graded Materials for Transport Applications") and INNVIN ("Innovative materials solutions for Transport, Energy and Biomedical sectors by strengthening integration and enhancing research dynamics of KMM-VIN").

The column "Cooperation" contains updated information on KMM-VIN's activity in the European Technology Platform on Advanced Engineering Materials and Technologies (EuMaT).

In the column "Research Fellowships and Trainings" information on the results of the 4th Call of KMM-VIN Research Fellowships programme are given. The former Summer Schools of the KMM-NoE project has been reactivated in cooperation with the International Centre for Mechanical Sciences (CISM), Udine, Italy. Details on the first KMM-VIN Advanced Course on tissue engineering mechanics (September 17-21, 2012) are given. In "Personalia" information on awards, distinctions and organisational achievements of our KMM-VIN Colleagues are presented.

The list of KMM-VIN Members (institutions) with their acronyms are given at the end of the Newsletter. For viewing the details of KMM-VIN members' profiles and information on current events the Readers are requested to visit our webpage www.kmm-vin.eu. The contact details to KMM-VIN Office can be found on the back cover of the Newsletter.

Marek Janas, Editor

LATEST NEWS

THE 7th GENERAL ASSEMBLY

The Annual GA Meeting 2012 was held on 22nd February 2012 in Brussels, convened and chaired by the KMM-VIN Chairman J. Eberhardsteiner. Representatives of 26 out of 33 core members (institutions and individual) were present. The Annual Report of the Board of Directors on KMM-VIN activities in 2011 (by M. Basista, CEO) as well as the report on 2011 accounts and 2011 budget (by K. Dolinski, KMM-VIN Secretary and B. Marchand, KMM-VIN accountant, LBBH Brussels) were presented. The General Assembly approved the 2011 accounts and the 2012 budget.

In the technical part of the Meeting the coordinators of the former Working Groups: Andreas Chrysanthou, Aldo Boccaccini, Christian Hellmich and Thomas Weissgärber reported about the activities of the WGs in 2011.

Substantial changes in the membership and research structure of KMM-VIN were approved by the General Assembly.

The 2013 Annual General Assembly Meeting of KMM-VIN will be held on February 26-27, 2013, with Day 2 devoted to technical sessions of the Working Groups.

The Minutes of the 2012 Annual GA meeting are available for viewing in members' area of the KMM-VIN website.

MEMBERSHIP CHANGES

A number of new institutional (core and associate) members mainly from the former COST projects on high temperature steels were accepted at the 2012 Annual Meeting of the General Assembly last February.

Several other applications for membership have recently been approved by electronic voting of the GA. The above changes give a rise in the number of institutional members from 37 to 62. The up-to-date list of KMM-VIN members, with their acronyms is given at the end of this Issue.

NEW STRUCTURE OF THE WORKING GROUPS

As it was already mentioned in the previous Newsletter a new structure of the Working Groups resulting from a broad discussion within KMM-VIN partnership was proposed by the Governing Board and accepted by the GA. The former materials-oriented classification has been replaced by a new one oriented at the industry sectors for which KMM-VIN partnership expertise is the most pertinent. The following four groups have been created: WG1, Materials for Transport, WG2, Materials for Energy, WG3, Biomaterials and WG4, Modelling (horizontal group). In each WG (except for WG4 which is temporarily being coordinated by KMM-VIN CEO) two co-coordinators have been elected by the General Assembly. The new WG

structure should appear more clear to potential external clients of KMM-VIN.

This structure and motivation behind are described in more detail in "What's New in Working Groups?"

RECENT EVENTS

The kick-off meeting of the **KMM-VIN WG2**. Materials for Energy was held at TU Graz on 17-18 July 2012. The purpose of the meeting was to approve the management structure of WG2, to overview the submitted two-page proposals and to start the WG2 research activities (see also "News from WG2").

The M30 project meeting of the **MATRANS** FP7 project was held on July 11-12, 2012 at IPPT, Warsaw.

The **4th iNTeg-Risk Conference 2012** took place in Stuttgart, Germany on 7-8 May 2012.

MUST EU (FP7) project held its 48M and **final meeting** on May 8-10, 2012 in Bad Soden, Germany. The project ends 30 Sep. 2012.

INNVIN EU (FP7) project "Innovative materials solutions for Transport, Energy and Biomedical sectors by strengthening integration and enhancing research dynamics of KMM-VIN" held its kick-off meeting on March 15, 2012 in Brussels

MATRANS EU (FP7), a cooperative research project coordinated by KMM-VIN (see also "KMM Projects") held its M24 project meeting on February 23-24, 2012 in Brussels and its M30 project meeting July 11-12, 2012, in Warsaw.

A new CSA project (FP7) **MatVal** ("Alliance for Materials – A value chain approach to materials research and innovation"), with KMM-VIN as a partner in the consortium, will start in Fall 2012.

ISWA EU project: Seven short movies about science and art ("*from fractals to stem cells*") produced within the ISWA project were presented to the general public and students at Università Politecnica delle Marche, Ancona on January 24, 2012, in Kosice (Slovakia) on March 29-30, 2012 and then on May 24, 2012 at IPPT, Warsaw.

FORTHCOMING EVENTS

KMM-VIN Advanced Course at CISM

A one-week KMM-VIN Advanced Course on "Skeletal tissue engineering mechanics, with links to biology, chemistry, and medicine", will be held at CISM (Udine, Italy), on 17-21 September 2012.

It is coordinated by Christian Hellmich (TUW) and Aldo Boccaccini (FAU), coordinators of the new KMM-VIN Working Group "Biomaterials" (WG3).

BioMed 2013 (10th IASTED International Conference on Biomedical Engineering, www.iasted.org/conferences/home-791) sponsored by the International Association of Science and Technology for Development (IASTED) to be held on February 13-15, 2013 in Innsbruck, Austria is chaired by Aldo Boccaccini (FAU). Several other KMM-VIN teams are involved in organisation of the conference: Enrica Verne (POLITO) will be the organiser of the symposium "Biomedical and Coatings, Christian Hellmich (TUW) – of the tutorial "Multiscale Mechanics of Bone and Bone Tissue Engineering".

Energy Materials 2012. KMM-VIN WG2 will be present with a poster presentation at the conference Energy Materials 2012, organized by R. Thomson, Loughborough University, October 16-19, 2012. (<http://energymats.lboro.ac.uk>).

KMM-VIN GENERAL ASSEMBLY annual meeting 2013 will be held in Brussels on 26-27 February 2013. During the second day of the meeting the four WGs will present their activities in 2012.

5th iNTeg-Risk Conference 2013 will be held in Stuttgart, Germany on May 21-24, 2013 Preliminary registration is now opened at:

<http://www.eu-vri.eu/fwlink/?LinkId=360>,

All queries at: integrisk-conference5@eu-vri.eu

WHAT'S NEW IN WORKING GROUPS?

NEW RESEARCH STRUCTURE OF KMM-VIN

The previous thematic structure of KMM-VIN emphasised materials classes being of principal interest for KMM-VIN members, i.e.:

WG1: Intermetallics (coordinated by Andreas Chrysanthou)

WG2: Composite Materials (coordinated by Aldo Boccaccini)

WG3: Functionally Graded Materials (coordinated by Christian Hellmich)

WG4: Functional Materials (coordinated by Thomas Weissgärber)

This structure seemed not very clear for potential external clients of KMM-VIN, hence, in the proposal to the FP7 CSA project INNVIN (started this year, with 21 KMM-VIN partners) we had to declare target industry sectors of KMM-VIN. Therefore, in 2011 KMM-VIN defined Transport (aerospace, automotive and rail), Energy (conventional in the first place but not excluding renewable energy sector) and Biomedicine as the target industry sectors (TEB) towards which a bulk of the KMM-VIN research on structural and functional materials will be oriented. The TEB sectors are the ones where KMM-VIN's S &T expertise has reached a critical mass.

After a broad discussion among the KMM-VIN members the General Assembly adopted a new structure which better corresponds to the usual structure of NMP Workprogrammes (EC) and fits better with the projects that many of the KMM-VIN members and KMM-VIN itself are involved in. Hence, it should give a better frame for partners' research activity in view of the envisaged KMM-VIN expansion towards the industry. The new thematic structure of KMM-VIN consists of the following Working Groups:

WG1. Materials for Transport, with coordinators:

Pedro Egizabal, Fundación Tecnalia, Donostia-San Sebastian and

Thomas Weissgärber Fraunhofer Institute for Manufacturing and Advanced Materials, Dresden;

WG2. Materials for Energy, with coordinators:

Monica Ferraris, Politecnico di Torino, and

Christof Sommitsch, Graz University of Technology;

WG3. Biomaterials, with coordinators:

Aldo Boccaccini, Friedrich-Alexander Universität Erlangen-Nürnberg

and Christian Hellmich, Technische Universität Wien;

WG4. Modelling, with temporary coordinator: Michal Basista, KMM-VIN / IPPT, Warsaw

The WG4 Modelling is a horizontal group, cross-cutting the vertical ones WG1, WG2, WG3. It reflects the modelling potential of KMM-VIN partnership and better fits the interests of prospective new members dealing with materials modelling.

NEWS FROM WG1: MATERIALS FOR TRANSPORT

Structure and main objectives of WG1. Materials for transport applications.

WG1 is presently composed of 36 KMM-VIN members. The expertise encompassed by this large group is really broad and varied and therefore it has been decided to create 4 different subgroups focused on 4 different families of materials. Each group will be coordinated by 1-2 leaders and each participant will be enlisted in at least 1 subgroup and maybe 2 subgroups as a maximum. A first distribution has been proposed that is currently being discussed by the group that is based on the following material types. WG1.1 Ferrous alloys, WG1.2 Nonferrous alloys, WG1.3 Composites and WG1.4 Other materials.

Each leader will boost the activity within each of the subgroups. The main activity would be focused on the development of internal projects funded by own internal funds and dealing with the development of materials, characterisation and modelling tasks. The group and its leaders will also think of other initiatives within each subgroup.

Other common aspects such as the identification of funding programmes, calls and potential proposal ideas and consortia, creation of discussion forums within the KMM-VIN webpage, exchange of information and researchers etc. will also be approached and stimulated by the coordinators of the WG1.

*Thomas Weissgärber (IFAM-DD) and
Pedro Egizabal Luzuriaga (TECNALIA),
WG1 coordinators.*

Presentation of Projects and Research Groups of WG1

Monitoring the microstructure degradation processes

For some time, a research team of the Laboratory of Anisotropic Structure of IMIM is developing a methodology of inspecting the microstructure deterioration in structural elements due to use. One of the most promising aspects in the field is diagnosing the so called *Technological Surface Layer*. Monitoring the degradation process of the especially constituted near-the-surface layer can be used in prediction of the safe use in service conditions time, very important parameter in safety of transportation system (e.g. in the railway). As a result of the research projects, the experimental and interpretational methodology of monitoring the microstructure degradation processes were developed. Moreover, a prototype measurement apparatus for tests in service conditions in railway is under construction.

Jan T. Bonarski, Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Kraków,

Shear strength tests on joined components

Shear strength tests on joined components, in particular for ceramics and CMCs, is a topic of intensive discussion within the scientific community. Some tests require a time consuming preparation of the joined samples: samples are usually cut from a large joined specimen. The cutting of small joined ceramic samples is intrinsically difficult, potentially dangerous in terms of crack formation, and surely time and material consuming. Several alternative tests for shear strength measurement have been developed in many laboratories and this is highly detrimental for the comparison of the results. Most of these tests do not work with a pure shear state of stress. Different test configurations (single lap in compression, double notch single lap in compression, asymmetric four point bending, torsion, Brazilian, B898, single lap offset, double-lap in compression) are being compared within a cooperation with Oak Ridge National Laboratory - ORNL, USA (E. Lara-Curzio, Y. Katoh) and Kyoto University, Japan (T. Hinoki).

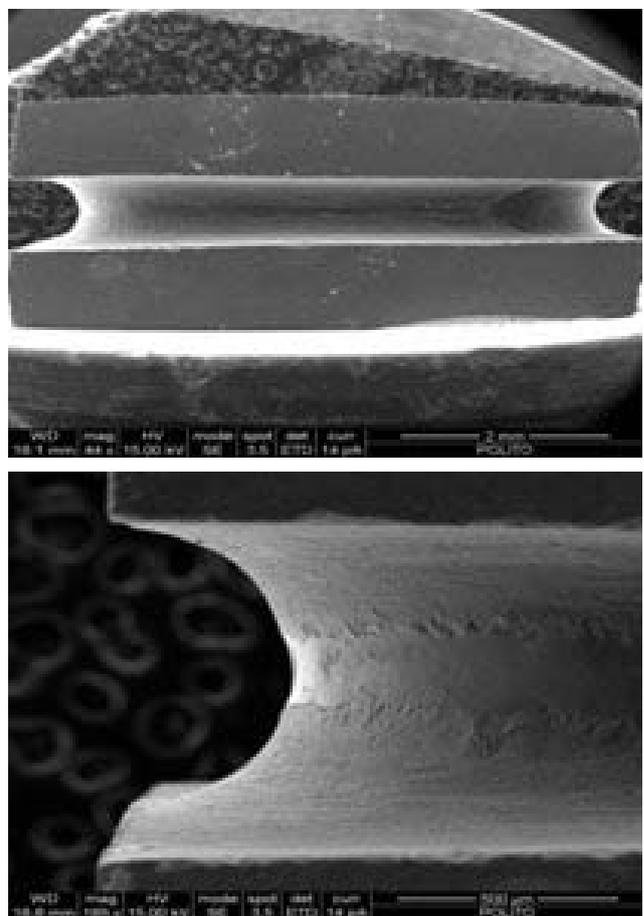


Fig. 1. Joined SiC hour-glass shaped samples for torsion tests (in collaboration with ORNL, USA and Kyoto University, Japan)

*Monica Ferraris, Politecnico di Torino,
Department of Applied Science and
Technology -DISAT,
Institute of Materials Physics and Engineering,
Torino, Italia*

AITEX expertise in composites industry.

Many diversification possibilities exist for Textile Sector in Composites Industry due to the wide variety of markets where these materials are employed. Furthermore, the diversity of production technologies and textile reinforcements able to be used in composites industry allow to imagine many applications for textile companies in this niche market.

Nowadays, AITEX research activities in regard of composites materials is mainly related to eco-composites development, where a high percentage of these compounds is biodegradable. In order to achieve this objective natural fibers are being applied as substitutes for glass and carbon fibers.

AITEX is able to develop a wide variety of textile reinforcements (knitted or woven fabrics, multilayers, spacers, non-wovens, etc.) just by using technical or conventional textile materials. Obviously, the structure of reinforcement will depend on the application and the technical requirements for the end product.

AITEX has also broad experience on surface modification of textiles. Traditional textile technologies and innovative textile techniques (e.g. electrospinning, plasma surface treatment, nanotechnology, enzymatic technology, etc.) could be successfully applied to develop new materials or processes for composites industry. Some of these technologies could be also used in order to modify the textile reinforcement surface of composites.

AITEX provides an Automotive Laboratory where different physical, chemical, microbiological and fire reaction tests are carried out with an advanced instrumental an adequate means to meet the request and necessities of each supplier.

Automotive and Transports laboratory offers a wide variety of analytic techniques to carry out tests according to specific standards required by the following industrial sectors:

Automotive, Railway Transport, Bus, Transport, Nautic, Aeronautic and Aerospace.

In Automotive laboratory of AITEX, both interior and exterior components are tested and controlled. All kind of materials are studied such us fabrics, non-woven, rubbers, polymers, foams, adhesives, felts, leathers.

Aeronautics-Aerospace

AITEX offers development, projects and analysis for the specific materials used in the Aeronautics-Aerospace Sector. It has qualified laboratories to carry out tests and to control fire reaction parameters, fume classification and toxicity, physical, chemical, material characterization, climatic, light ageing, acoustic and vibration, all of them based on the sector requirements, applied to the interior materials that are to be used.

Navigation

The Technological Institute has qualified laboratories to carry out the specific standards needed in the Navigation Sector, quality control and assurance, both of the materials that make up the navigation system as well as clothing and staff equipment.

Korina Molla, AITEX - Instituto Tecnológico Textil, Alcoy, Spain

Materials for aeronautics

The research activities of International Centre of Electron Microscopy for Materials Science at AGH University of Science and Technology, Krakow (<http://www.tem.agh.edu.pl>) in the field of materials for aeronautics concern mainly innovative materials for aircraft gas turbines. The materials for the hottest sections of jet turbine engines are investigated in cooperation between United Technologies Corporation /Pratt & Whitney Division and AGH-UST (coordination by Aleksandra Czyska-Filemonowicz, AGH-UST and Agnieszka Wusatowska-Sarnek, P&W. Within this co-operation, 2 PhD theses on advanced Ni-base superalloys are jointly realized:

- "Microstructure stability of second and fourth generation single crystal nickel-base superalloys during high temperature creep deformation" (Maciej Zietara, AGH-UST Krakow, 2011)
- "The influence of precipitates on Inconel 718 superalloy strengthening at high temperature" (Krzysztof Kulawik, in progress).

Recently, the monograph on "Microstructural changes during creep of single-crystalline nickel-base superalloys" was published by Beata Dubiel. It provides the fundamentals of the microstructure and deformation mechanisms of single crystal superalloys followed by the results of microstructural investigation. The microstructural changes during creep are controlled by dislocation movement and the work thus mostly concerns the characterisation of dislocation substructure by means of TEM. The analysis of the dislocation substructure evolution during creep enabled the interpretation of microstructural changes of the CMSX-4 blade during exploitation in stationary gas turbine.

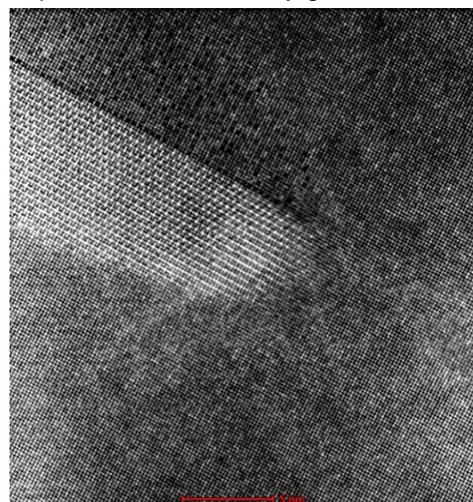


Fig. 2. HRSTEM-HAADF image of the two-phase γ'' - γ' precipitate in the nickel-base superalloy IN718 for aeronautic application (K. Kulawik, AGH-UST).

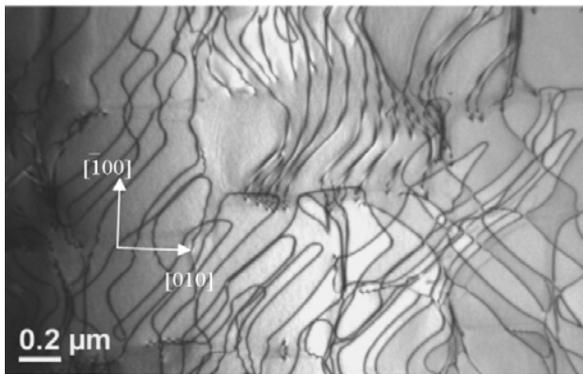


Fig. 3. Dislocations in CMSX-4 single crystal superalloy in the primary creep range at temperature 950 °C and stress of 185 MPa. TEM bright-field image (B. Dubiel, AGH-UST)

Aleksandra Czyska-Filemonowicz, International Centre of Electron Microscopy for Materials Science & Faculty of Metals Engineering and Industrial Computer Science, AGH University of Science and Technology, Kraków, Poland

**SPANISH STRATEGIC PROJECT:
New Automotive Components of High Performance by Applying Nanotechnology (NANO-4-CAR)**

CIDETEC has recently led a project for the development of components and manufacturing processes for the automotive industry, through the use of nanotechnology in three technological lines of action: coatings, materials and lubricants. The consortium consists of leading companies in the automotive sector in the Basque Country as well as several technological research centers in the area.

The main objectives of the project are the development of plastic materials with less wear under friction for structural parts, the development of anti-corrosion coatings for metal parts of the car (calipers) and the development of more effective and temperature resistant lubricants.

Nanotechnologies may represent an interesting alternative to improve the efficiency of processes and the development of higher added value materials, maintaining similar levels of competitiveness in terms of costs. Previous projects carried out by R & D agents in relation to nanotechnologies, have generated a fundamental knowledge to undertake research with guarantees in industrial applications.

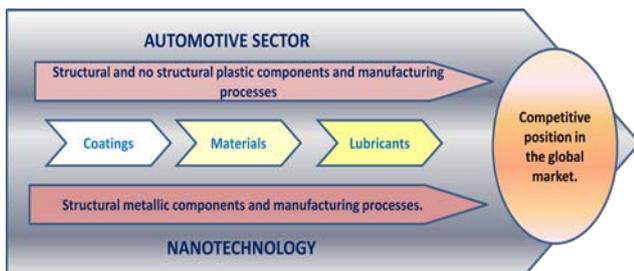


Fig. 4. Development of a trivalent chromium bath based on Ionic Liquids (CIDETEC)

CIDETEC has started a new project focused on the development of a new trivalent chromium plating solution. Toxicity of hexavalent chromium processes has led to an increase in the development of new trivalent chromium solutions, where ionic liquids based processes have emerged as an alternative to the conventional aqueous systems due to their excellent properties such as their low vacuum pressure, wide electrochemical window, conductivity and their tunable properties. Ionic liquids can offer a green alternative to conventional processes, as well as a more efficient process from an industrial point of view.

This technology is based on the so-called D.E.S (Deep Eutectic Solvents), mixture of a quaternary ammonium salt and a hydrated metal salt which is liquid at room temperature, the absence of water in the media avoid the hydrogen embrittlement, one of the main problems in the water based processes. Absence of hexavalent chromium during the process, no H₂ evolution and an improved efficiency of the process are the main features of the ionic liquids based electrolytes, which lead to this technology to be a real alternative to conventional trivalent chromium solutions by means of an environmentally friendly process.

Hans-Jürgen Grande, Fundación CIDETEC-IK4. Donostia/San Sebastian, Spain

**NEWS FROM WG2:
MATERIALS FOR ENERGY**

The news is that we have one **Working Group (WG2) on Materials for Energy** operating within KMM-VIN. The new WG2 has been formed by joining members of the former COST network of ferritic-martensitic 9-12% Cr-steels for thermal power plants as well as "old" KMM-VIN members interested in different materials for energy applications.

Christof Sommitsch, Graz University of Technology, Austria (christof.sommitsch@tugraz.at) and Monica Ferraris, Politecnico di Torino, Italy (monica.ferraris@polito.it) co-coordinate this group.

Currently, WG2 is composed of ca. 35 research centers / universities and ca. 25 companies, in 15 EU countries and is still growing.

The thematic scope of WG2 is related to materials design, production and characterization for energy production. Materials for Energy is a very broad topic, which can comprise ferritic and austenitic steels, Ni-based superalloys, Ti-based alloys, ceramics, ceramic matrix composites, etc. It can also include materials issues for energy production from renewable sources, biomass combustion, fuel cells, nuclear energy plants, petro-chemical industry, etc.

The aim of this Working Group is to do joint research activity on Materials for Energy, possibly within funded projects, but surely also on a bottom-up, free, scientific basis.

In order to start joint research activity, a very first action will be to analyze the 7th FP working documents in order to find calls of potential interest for WG2 partners. KMM-VIN office help in providing this information will be used as a starting point.

WG2 partners are encouraged to look for partners within the WG2 mailing list, of course if the required expertise is suitable for the project. As an added value to a usual partner search through CORDIS, experience deriving from previous common activity can be exploited, as well as occasions for informal meetings deriving from KMM-VIN activities. To stimulate such search for partners a new column "Partner Search" is added into this Newsletter. For this purpose the "OFFER-SEARCH" action launched within KMM-VIN partnership to facilitate bilateral research cooperation between KMM-VIN members (cf. <http://collaboration.kmm-vin.eu>) may also be used.

In parallel, international knowledge search companies: NineSigma <http://www.ninesigma.com>, Innoget, <http://www.innoget.com/> and others will be contacted to offer expertise available within WG2: partners will be encouraged to do so individually; technology requests received from these companies, of potential interest for WG2 partners, will be circulated. Finally, information on national or industrial projects able to include international partners will be circulated among WG2 members.

As a quick and effective area of exchange, there is one folder "KMM-VIN WG2" on Dropbox open to WG2 partners. Also a common protected area on KMM-VIN website with easy upload option can be used for this purpose.

Starting Research Plan

It was decided to start with an already existing research plan that is based on the proposal "**EMEP – Engineered Micro- and nanostructures for Enhanced long-term high-temperature materials Performance**", for COST funding in 2011. The focus is on the development of innovative materials solutions based on detailed understanding and modelling of high-temperature microstructure degradation processes and surface protection against steam oxidation, and on simulation of manufacturing processes for large components to ensure optimal properties during scale up from laboratory samples to industrial use.

Working topics have been defined and coordination as well as organization components of EMEP will be transferred to and implemented in WG2 from the beginning, such as a Management Committee, which will govern the scientific work based on selected two page proposals by the WG2 members.

The **kick-off meeting of WG2** was held on July 16-18, 2012 in Graz: more than 50 people attended the meeting and some common activity have been planned in the field of creep resistant martensitic steels for thermal power plants. Some new common activity on SOFC and joining for energy has also

been envisaged. Presentations can be downloaded from KMM-VIN WG2 web-page. Proposals for new research activity in the field of Material for Energy can be submitted to WG2 coordinators (Ch. Sommitsch and Monica Ferraris) any time, better before October 2012: they will be used to form consortia for funding, to do collaborative research, and to incorporate research relevant to the already existing EMEP research program.

Some ongoing projects involving WG2 members are listed below together with webpages and contact points:

MACPLUS (<http://macplusproject.eu>) "Material-Component Performance-driven Solutions for Long-Term Efficiency Increase in Ultra Supercritical Power Plants", project coordinator: C.S.M. S.p.A.

NextGenPower (<http://nextgenpowerproject.eu>) "Meeting the Materials and Manufacturing Challenge for Ultra High Efficiency PF Power Plants with CCS". project coordinator: KEMA.

IMPACT – Innovative Materials, Design and Monitoring of Power Plant to Accommodate Carbon Capture (UK industry-led collaborative project).

CRESTA (<http://www.cresta.cc>) "New Creep REsistant STAbile steel for USC Power Plant"

HotPipes - Development, manufacturing and application of a SHM-system for high energy pipes in power plants (EraSME project).

NewMat (New Materials for Energy Systems), (<http://www.kic-innoenergy.com>) project coordinator: AGH-UST within CC PolandPlus.

VADPSheets "Property oriented design of hard constituent hardness and morphology in continuously annealed/galvanized DP sheets"; project coordinator: IMZ.

SOFC600 (<http://www.sofc600.eu>):

"Demonstration of SOFC stack technology for operation at 600 °C. ITC participated in SOFC600 project through a partner company: AECA Aplicaciones Energéticas de Cerámicas Avanzadas).

Thermodynamics of alloys for safe hydrogen storage and energy", IMIM PAN, 2012-2014 (j.bonarski@imim.pl).

COOL-Coverings <http://www.coolcoverings.org>

"Development of a novel and cost-effective range of nanotech improved coatings to substantially improve NIR (Near Infrared Reflective) properties of the building envelope".

*Monica Ferraris, Politecnico di Torino and
Christof Sommitsch, Technische Universität Graz,
WG2 coordinators*

Presentation of Projects and Research Groups of WG2

Improved 9%Cr steel development (presented by TUG)

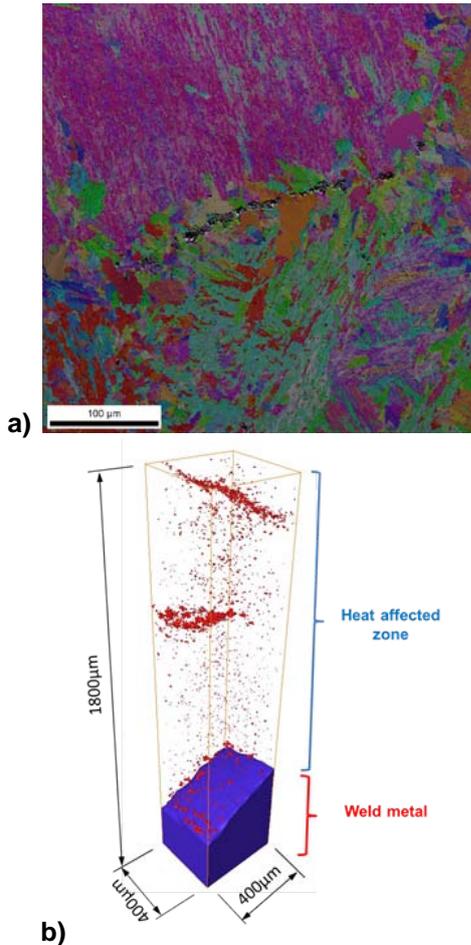


Fig. 5. Void formation as a precursor of type IV cracking at the prior austenite grain boundaries of MARBN steel 9Cr3W3CoVNbMN: **a)** Electron backscatter diffraction image of the void formation in the HAZ of a crossweld sample failed after 12900 hours at 80MPa and 650°C; **b)** 3D synchrotron micro tomography image of the specimen failed after 17200 hours at 70MPa and 650°C (C. Schlacher et al.: Creep and damage investigation of improved 9%Cr steel welded joints, "9th International Conference on Trends in Welding Research, ASM, USA, 4-8 June 2012")

Project VADPSheets (Presented by IMZ)

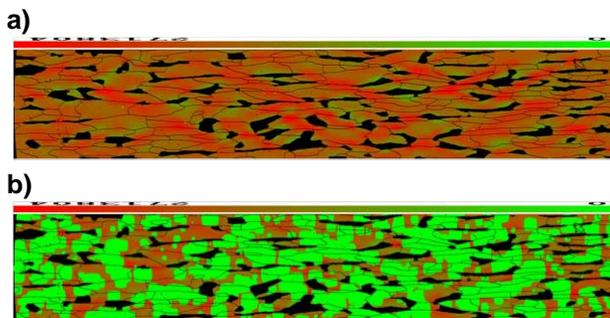


Fig. 6. Modelling of static recrystallization in cold-rolled DP steel using Cellular Automata model (to be published in Computational Material Science Journal). **a)** DP steel after cold rolling; **b)** DP Steel after annealing to 690°C at rate of 3 °C.

Project SOFC600 (presented by ITC)

The introduction of a compound capable of releasing oxygen, such as MnO_2 , greatly improves the foaming ability of Si_3N_4 used as foaming agent in soda-lime glass powder, leading to expansion at a relatively low temperature (800–850 8C) and short processing time (7–30 min). The effect is based on the supply of oxygen, in addition to that in the furnace atmosphere. At the highest level of porosity, however, the strength of foams is negatively affected by a coarse microstructure, determined by cell coalescence. The reduction of firing temperature or, above all, the reduction of the processing time, was found to limit the coalescence and significantly improve the strength of the foams (A. Saburit et al., Foaming of flat glass cullet using Si_3N_4 and MnO_2 powders, *Ceramics International* **35** (2009) 1953-1959).

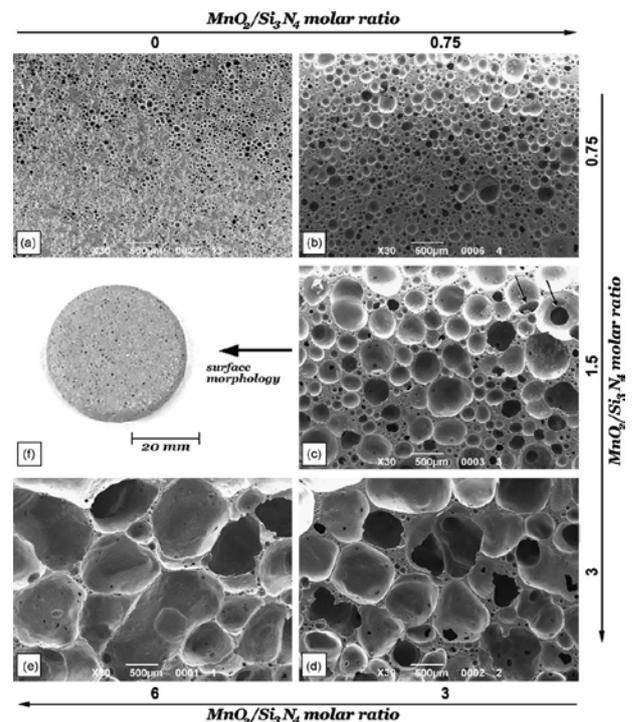


Fig. 7. Morphological evolution of glass foams with MnO_2 amount ($Si_3N_4 = 3.5$ wt%, 15 min at 850 8°C): (a) $MnO_2/Si_3N_4 = 0$; (b) $MnO_2/Si_3N_4 = 0.75$; (c) $MnO_2/Si_3N_4 = 1.5$; (d) $MnO_2/Si_3N_4 = 3$; (e) $MnO_2/Si_3N_4 = 6$; (f) surface morphology of the sample with $MnO_2/Si_3N_4 = 1.5$.

CIDETEC: Feature paper on ZnO-based dye-sensitized solar cells (published in Journal of the Physical Chemistry C)

IK4-CIDETEC is carrying out cutting-edge research on the synthesis and deposition of binary metal oxides by wet-chemistry approaches and their application in the energy sector. In particular, IK4-CIDETEC research activities demonstrate the great potential of nanostructured metal oxides to be used as building blocks in different emerging photovoltaic technologies. IK4-CIDETEC published recently, in collaboration with Prof. Anta's group from University Pablo Olavide, Seville, Spain, a feature paper entitled "ZnO-based dye-sensitized solar cells" in Journal of the Physical Chemistry C.

The paper, which was awarded with the cover of the volume published by 31/05/2012:

<http://pubs.acs.org/action/showLargeCover?issue=365715144>, summarizes the main progresses attained by both research groups and reports also on a critical perspective analysis, suggesting a change of focus of the current research, for ZnO-based dye-sensitized solar cells.

Electrocatalysis for energy at IK4-CIDETEC www.cidetec.es

Worldwide demand for energy is increasing at an alarming rate. This demand is being met largely by fossil fuels that generate greenhouse gases (GHG) and other toxic emissions. In this scenario, the development of more efficient and clean energy conversion and storage technologies is mandatory. In the short term, renewable energies will supply the increased demand, while the transition towards a hydrogen-based economy occurs.

Electrocatalysis, electrode processes where charge transfer reactions depend strongly on the nature of electrode material, will play a capital role in the development of energy conversion and storage electrochemical technologies, because the inherent advantages of electrochemical processes compared to the chemical ones.

Fuel cells and electrolyzers, redox flow cells, and environmental technologies for the abatement of GHG and other pollutants are electrochemical solutions to the global-warming and pollution problems. However, it is still necessary to improve these technologies to reach a level of maturity that allows its implementation on a large scale.

With this aim at IK4-CIDETEC we are developing electrocatalysts with improved performance and durability for PEM fuel cells, based on novel supports which enhance the metal-catalyst interaction, and new electrocatalysts for water splitting which allow reducing the cost and avoid the use of carbon materials. Furthermore, we are developing electrocatalysts for energy storage to increase the power delivered and the amount of energy stored in flow cells. IK4-CIDETEC is willing to establish contact with international teams to explore cooperation to further develop these concepts. More information at www.cidetec.es.

NEWS FROM WG3: BIOMATERIALS

Thoughts and Suggestions

WG3 is presently composed of 22 KMM-VIN members. There is considerable expertise in this group in three fundamental areas where Materials Science contributes to the biomedical field, namely: to improve established materials for medical devices, e.g. implants, and to develop new, multifunctional and bioactive materials for regenerative medicine and tissue engineering. There is also considerable interest in the application of biomimetic approaches to the field of biomedical materials applications. Certainly the name of the group "Biomaterials" encompasses also the group of "natural" materials and nature mimicking materials, which can be considered for a wide range of applications, e.g. not only in the biomedical field.

The expertise available in WG3 is very broad and varied and we are planning to form subgroups along the lines described above. We have not discussed this proposal in detail with all partners but we will propose soon the division of WG3 into subgroups as follows:

- Biomedical materials: traditional applications and drug delivery
- Biomedical materials: tissue engineering and regenerative medicine
- Biomimetic and natural materials

Certainly consultation with WG3 group members will lead to confirmation of these 3 subgroups or suggestions for alternative subgroups.

Each group will have 1 subgroup leader, each participant will be able to participate in as many subgroups as necessary, according to their expertise.

The general vision of collaboration within WG3 will be planned in consultation with the 3 groups leaders and both of us as WG3 coordinators. Initially, we plan to focus on impulsing short (mini) projects in which at least 2 partners will participate, these projects will be funded by the local budgets of the participants institutions or (for example to support travel) by local national funding. One interesting possibility will involve the co-supervision of Master or Bachelor thesis, in which part of the research can be carried out at a partner institute. The webpage will contain a list of topics offered by each (academic) institution and this will enable students to pick and choose. In the overall strategy for the development of collaborations within WG3 other initiatives will be proposed, e.g. originated in each subgroup and across all subgroups. This could be a tangible implementation of the KMM-VIN Offer-Search action within WG3 (<http://collaboration.kmm-vin.eu>).

The identification of research funding programs at bilateral, multilateral and European level will be part of the tasks of the subgroup leaders and of us as WG3 coordinators.

We are starting slowly but will accelerate as fruitful collaborations will be established and will grow!

*Aldo R. Boccaccini (Erlangen) and
Christian Hellmich (Vienna), WG3 Coordinators*

Presentations of Projects and Research Groups of WG3

New Project at the Institute of Biomaterials, University of Erlangen-Nuremberg

The research project "Bioactive materials, cell and tissue printing: New therapeutic approaches for organ level tissue engineering and regenerative medicine" has been selected as one of the "Emerging Fields" projects of the University of Erlangen-Nuremberg (FAU), Germany. The project will be funded for 2 years. Coordinator is Aldo R. Boccaccini (Institute of Biomaterials) with 5 co-investigators from the Faculty of Medicine, the Faculty of Engineering and the Faculty of Sciences of FAU.

The aim of this project is to establish a multidisciplinary research consortium at the FAU to develop complex, functional tissues and organs based on smart combinations of bioactive materials, cells and tissue printing. The approach relies on the combination of novel (nano) biomaterials, which will be shaped and micro-structured using innovative rapid prototyping techniques in conjunction with "cell printing" methods (bioprocessing). The ultimate goal is to engineer a range of organ-specific 3D tissues with a pre-formed functional vascular capillary bed and vascular trees such that large tissue lesions can be repaired with short healing time. We anticipate collaborations with several KMM-VIN members in the context of this project.

DegraLast – new project at IFAM

The Fraunhofer Society has granted IFAM (Fraunhofer Institute for Manufacturing and Advanced Materials, Bremen) and three partner institutes a new three-year project to develop iron-calcium phosphate and magnesium-calcium phosphate composite materials for degradable, load bearing bone implants. In the DegraLast consortium, IFAM will be in charge of materials development and processing of iron-calcium phosphate composites. Besides, development suitable of test systems for in vitro biocompatibility, mechanical properties and degradation behaviour will be addressed in this project.

Further project partners involved in DegraLast are:

- Fraunhofer Institute for Laser Technology (ILT),
- Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB),
- Fraunhofer Institute for Biomedical Engineering (IBMT).

UPM – Universidad Politécnica de Madrid

Universidad Politécnica de Madrid (www.upm.es) is the oldest and largest Spanish technical university, with 4.000 faculty members and 44.000 students. The UPM has been recognized as the Spanish university with the highest number of EU projects approved, with more than 40 M€ of EU funding.

Among several laboratories and research institutes devoted to materials science at UPM, the UPM's **Product Development Laboratory** focuses on design of novel micro-structured materials and rapid prototyping of medical devices and solutions for **Tissue Engineering**. Currently we are developing special scaffolds for cell growth based on the use of fractal geometries for promoting desirable contact phenomena and biological interactions, in parallel to the Fractal-Bio research initiative. Some recent results have been published in Plasma Processes and Polymers (A. Díaz Lantada, et al. - "Tissue engineering using novel DLC-coated rapid prototyped scaffolds"). We are now concentrating on the use of master rapid prototypes for manufacturing molds and stamps for final replication of biodevices using biomaterials, such as, e.g., polycaprolactone, PDMS, bee-wax, among others.

We have been also very actively researching in the field of active or "intelligent" materials for the medical industry, trying to cover aspects linked to synthesis, processing, characterization and modeling of materials, as well as strategies to promote their integration in the whole development process of novel medical devices. Some additional information about our research has been summarized in form of a handbook describing several families of active materials and their medical applications (A. Díaz Lantada.- "Handbook of Active Materials for Medical Devices: Advances and Applications", Pan Stanford Publishing, Singapore 2012).

As new members of the KMM-VIN we would like to collaborate with different partners in projects linked to the development of novel multi-level structured materials for the Biomedical Engineering and in activities linked to the search for applications and development of novel biodevices based on such knowledge-based multifunctional materials."

*Andrés Díaz Lantada
Mechanical Engineering Department,
Universidad Politécnica de Madrid*

Bionica Tech

Bionica Tech s.r.l. operates in the field of high-tech biomedical products for applications in orthopaedic surgery, oral implantology, spinal surgery. Its mission includes the design, development, validation, industrialization, and the introduction into the market of highly technological products based on innovative materials, including composites.

Bionica Tech was born in early 2010 as a spin-off of the **Materials Science and Chemical Engineering Department** (now called DISAT) of **Politecnico di Torino**. Founding members are three DISMIC researchers that, during the last five years, have developed and patented several innovative solutions for materials, production processes and treatment for medical devices aimed at the use in prosthetic and biomedical fields.

The company structure was then enriched with skills in other fields, such as medicine, administration, management and industrial development.

The purpose of Bionica Tech is to turn innovative patented ideas into products that can be shortly put on the market, as accompanied by a complete validation (e.g. chemico-physical and mechanical tests, in-vitro cell cultures, in-vivo and clinical tests, validation master plan for the product certification, etc.) and by a detailed business process protocol.

Bionica Tech's mission is the transformation of innovative ideas into feasible industrial processes, both directly and through partnership¹ with other companies of biomedical and R&D fields.

In fact, Bionica Tech aims to enrich a patented² idea with a high surplus-value, turning it into a product tailored to meet the specific requirements of the biomedical market.

For expertise in specific topics, see also the column "Partner Search for Project Proposals – POLITO"

¹ Politecnico di Torino and Restoration Project (Consortium of 11 partners)

² 4 patents concerning titanium surfaces with high osteointegration ability and antibacterial properties, antibacterial bone cements, osteoinductive cements for spinal surgery (resorbable or not).

Bionica Tech S.r.l.: Main office: c/o I3P, C.so Castelfidardo, 30/a - 10129 Torino (TO) Italy
Contact Person: Chiara Vitale Brovarone
Email: chiara.vitale@bionicatech.it
Website: <http://www.i3p.it/imprese/148>

POLITO - Partner search for new projects proposals

GLANCE group (Glasses, Ceramics, Composites <http://www.composites.polito.it>), **DISAT** (Applied Science and Technology Department), - POLITO and its spin off **Bionica Tech** seek partners for proposals in the topics of the call NMP in Biomaterials. For details - see the column "**Partners Search for Project Proposals**"

NEWS FROM WG4: MODELLING

The WG4. Modelling is a horizontal working group of KMM-VIN supporting WG1. Materials for Transport, WG2. Materials for Energy and WG3. Biomaterials with a wide spectrum of models and simulations relating to materials design, materials properties and materials behaviour under service conditions. At present WG4 comprises 34 research groups of different expertise and research interests. These include i.a. atomistic approaches, continuum micromechanics and multiscale models, phenomenological analytical and numerical models.

WG4 is at the very beginning of the self-organization process. Preliminary analysis of the records of Expertise-Interest forms and an internal survey on modelling yielded the following list of topics and members interested in those topics, which can be the basis for future joint research activities of WG4:

Materials design by modelling: Atomistic modelling and *ab initio* methods - phase diagrams, mechanical properties (elastic constants, stacking faults, dislocation interactions), thermodynamic properties, surface and interface properties, electric properties (MCL, ONERA, BioIRC, TUG, WUT, SZMF, V&MD, CRF, IFAM, TUW, UH, IMIM, IPPT, IWM, LU, MPA, VTT).

Micromechanical and multiscale modelling of materials (IPPT, MCL, ONERA, BioIRC, NPLML, LU, TUW, VGTU, IMBAS, MPA, TUG, UPM, VTT).

Phenomenological thermomechanical models of materials response: inelasticity, plasticity, thermodynamics, constitutive equations (ONERA, POLIMI, IPPT, NPLML, VGTU, IMBAS, MCL, TUG, UPM).

Numerical methods: FEM, FDM, BEM, Discrete Elements, meshless methods (IPPT, TUG, ONERA, VGTU, BioIRC, CIDETEC, CRF, IFAM-DD, IPM, TUW, UH, POLIMI, IMBAS, MCL, IWM, SWG, TUD-IfW, UPM, ITC).

Modelling of effective properties of heterogeneous materials (IPPT, ONERA, WUT, NPLML, TUW, POLIMI, VGTU, IMBAS, MPA, TUG, UPM, VTT, ITC).

Damage mechanics and fracture mechanics modelling (ONERA, POLIMI, IPPT, MERL, NPLML, SZMF, VGTU, IMBAS, MCL, MPA, SZMF, TUD-IfW, TUG, VTT).

Modelling of cracks driving forces in graded materials and composites (MCL, IPPT, MERL, ITC).

Modelling of wear, oxidation and corrosion (IPPT, KEMA, NPLML, SZMF, CIDETEC, TUW, POLIMI, IMBAS, IWM, UPM, VTT).

Modelling of low cycle fatigue and thermo-mechanical fatigue in materials under complex loading (IPPT, MCL, TUW, IMBAS, MPA, UPM).

Modelling of creep, creep-fatigue interaction and life assessment (TUG, ONERA, KEMA, NPLML, V&MD, TUW, VGTU, IPPT, MERL, IWM, TUD-IfW, VTT).

Modelling of heat transfer problems (IFAM-DD, MCL, ITC).

Modelling of transport phenomena (BIOIRC, IFAM, VGTU, IMBAS, ITC, IWM).

Thin films: constitutive modelling, mechanical description and numerical analysis of defects and deformations (MCL, IPPT).

Life prediction of Thermal Barrier Coating systems: coupling of oxidation, sintering, diffusion, creep, damage and fracture phenomena (ONERA, IPPT).

Modelling of manufacturing processes by powder metallurgy, powder compaction, sintering, sheet metal forming (IPPT, WRUT).

Simulation of materials processing (TUG, MCL, SZMF, VAGL).

Modelling of martensitic transformations and twinning (IMZ, IPPT).

Phase field and Cellular Automata modelling of phase transformations (IMZ, TUG).

Microstructure modelling of metals during processing: hot and cold rolling, forging, heat treatment and welding (TUG, MCL, ALSTOM, SSF).

Micromechanical modelling of powders, particulate materials and solids by Discrete Element (Molecular Dynamics) methods (VGTU, IPPT, ITC).

Modelling of crystal plasticity (MCL, IPPT).

FE modelling of rail-wheel contact: plastic deformation, residual stresses, damage initiation, crack growth (MCL, IPPT).

Design of brake disks by modelling: heat generation, formation of hotspots, thermo-mechanical fatigue, crack initiation, crack growth (MCL, IPPT).

Modelling of crack propagation in ceramic materials and metal-ceramic composites during cooling; modelling of crack propagation in glass matrices with crystalline particles with account of micro and macro residual stresses (ITC, IPPT).

*Michal Basista, KMM-VIN
WG4 coordinator ad int.*

KMM PROJECTS

During the past six months KMM-VIN has continued, as coordinator or partner, the execution of several FP7 projects: MATRANS, INNVIN, iNTeg-Risk, MUST, M-FUTURE2011 (completed). Also, there is a number of successful projects coordinated by KMM-VIN members involving different groups of KMM-VIN members, without KMM-VIN being included in the consortia. To this end the following projects should be named: ISWA, JOLIE, NAMABIO, GLaCERCo.

MATRANS (FP7)

“Micro and Nanocrystalline Functionally Graded Materials for Transport Applications” – project coordinated by KMM-VIN (M. Basista) started 1 Feb. 2010, duration 3 years. The consortium consists of 10 Beneficiaries and 6 third parties in the so-called KMM-VIN grouping (IPPT, IMIM, ITME, TUD, UNIVPM, POLITO – all KMM-VIN core members). Among the project Beneficiaries there are also 3 other KMM-VIN members: CRF, FHG (IFAM-DD) and R-TECH. The project webpage: <http://matrans.kmm-vin.eu>.

MATRANS aims at development of novel metal-ceramic functionally graded materials (FGMs) for aerospace and automotive applications in: (i) exhaust and propulsion systems (ii) power transmission systems, (iii) braking systems, with the main objective to enhance the mechanical properties of these materials. MATRANS deals with two groups of the graded bulk composites: alumina ceramics - copper/copper alloys and alumina ceramics - intermetallics. The EC contribution is 3.6 M€ with the KMM-VIN grouping's share of 2.38 M€.

For details of the organisation and results please consult the “MATRANS Newsletter 2012” at the site Projects/Matrans/Public-documents of www.kmm-vin.eu webpage.

iNTeg-Risk (FP7)

“Early Recognition, Monitoring and Integrated Management of Emerging New Technologies Related Risks.” A large 4.5 year project started in December 2008, coordinated by KMM-VIN member - European Virtual Institute for Integrated Risk Management (A. Jovanovic). KMM-VIN grouping comprising IPPT, IMRSAS, IMIM, MCL is a project partner. Further KMM-VIN members (MERL and R-TECH) are also involved in the project beyond KMM-VIN grouping. The total share of KMM-VIN grouping (4 members) in the EC funding is 185.5 k€, <http://integrisk.eu-vri.eu>.

INNVIN CSA (FP7) – **“Innovative materials solutions for Transport, Energy and Biomedical sectors by strengthening integration and enhancing research dynamics of KMM-VIN”**. Coordinator: KMM-VIN (M. Basista); started 1 Feb. 2012, duration 3 years.

The INNVIN project is one of 5 CSA projects originating from the former 14 Networks of Excellence in G3 Materials Unit of NMP.

INNVIN involves KMM-VIN as the beneficiary and 21 of KMM-VIN members as third parties linked to KMM-VIN. The primary objective of INNVIN project

is to engage the large transnational partnership of KMM-VIN in the process of transforming it into an organization with a more effective strategy towards the industry, which should enhance KMM-VIN's financial viability. KMM-VIN will primarily focus on Transport, Energy and Biomedical sectors as these are the ones where KMM-VIN's expertise has reached a critical mass. This orientation is already reflected in the new structure of KMM-VIN Working Groups.

The total EC funding for KMM-VIN consortium: 444.000 €

NAMABIO (COST) - Materials, Physical and Nanosciences COST Action MP1005: **“From nano to macro biomaterials (design, processing, characterization, modelling) and applications to stem cells regenerative and dental medicine”**.

The aim of NAMABIO action is to coordinate research efforts to obtain a real breakthrough in the area of regenerative medicine of bones and teeth. The project started in April 2011 and scheduled for 5 years. is coordinated by UNIVPM (F. Rustichelli) and involves nine KMM-VIN members (UNIVPM, TUW, FRAUNHOFER-IFAM, FAU, AGH-UST, IMIM, WUT, BioIRC, UH). The project covers processing of innovative biomaterials; chemical and physical and mechanical characterization; modelling of physical and mechanical properties; stem cell loading on biomaterials, implantation on animals, and histological and molecular evaluation; 3D structural characterisation of tissue engineered bones and teeth by X-ray synchrotron microtomography.

Already two calls for applications for Short - Term Scientific Missions for NAMABIO were issued.

JOLIE (MATERA+) **“Joining of Lightweight alloys to advanced FGM metal-ceramics materials”**. A MATERA project coordinated by POLITO (M. Ferraris) and involving three KMM-VIN members (POLITO, CRF, EMPA). The aim of the project is to obtain a new car brake-disk system by joining one or more wear-resistant ceramic composite inserts to a lightweight alloy-bulk material to obtain lighter components and to improve energy efficiency. It started in June 2011 for a duration of two years.

GlaCERCo – ITN (FP7-People) **“Glass and Ceramic Composites for High Technology Applications – Initial Training Network”**. Project coordinated by POLITO (M. Ferraris) started 1 February 2011, with 3.9 M€ funding during 4 years; www.glacerco.eu.

Among the 10 partners 5 are members of KMM-VIN (POLITO, FAU, UNIPAD, IPM, MERL). The project offers a multidisciplinary training in the field of new high-tech glass based materials (glasses, glass-ceramics, glass- and glass-ceramic composites and fibres) with special attention to applications in strategic fields such as medicine (bioactive glasses as bone replacement and drug delivery systems), telecommunications (glass devices for broad-band applications), photonics (glass based

photonic sensors), clean energy (Solid Oxide Fuel Cells glass sealants), waste management (vitrification and re-use of wastes).

GlaCERCo events of 2012:

1st GlaCERCo Network-wide Workshop and Annual Meeting, Brno, 8-10 Feb 2012.

International Working Group Meeting “Ceramic Materials for Energy and Environmental Applications”, Torino, 5 July 2012

1st GlaCERCo International Project Management Workshop Torino, 17-18 July 2012.

ISWA (FP7) <http://iswa.fisica.unina.it>

“Immersion in the Science Worlds through the Arts”. A CSA project coordinated by UNIVPM (F. Rustichelli) started 1 March 2011 for a duration of two years. Among 16 participants from 15 countries are 4 KMM-VIN members: UNIVPM, IPPT, IMRSAS and TUW. The project is targeted at young people discovering the common characteristic of the creative process in arts and sciences. Examples of artistic events based on scientific issues are realized and displayed in several European cities.

SILICOAT (FP7)

“Industrial implementation of processes to render RCS safer in manufacturing processes”

– European project coordinated by ITC. The partners are: Associations of companies of tile manufacturers like ASCER, APICER, ZIEGEL, and companies like the Spanish PORVASAL, ATOMIZADORA, Italian CERAMICA FLAMINIA, S.p.A., German AKI-Arbeitsgemeinschaft Kerami, WALKÜRE and research centres like Centro Ceramico di Bologna, Fraunhofer Institut für Toxik (ITEM-Fraunhofer). Crystalline silica is an essential raw material for the production of virtually all the goods of everyday life. However, Respirable Crystalline Silica (RCS) are classified as strongly carcinogenic for humans. The main objective of the present project is the industrial implementation of treatments in the ceramic manufacturing processes transforming the quartz-containing raw materials into intrinsically safe products.

MACPLUS (<http://macplusproject.eu>)

“Material-Component Performance-driven Solutions for Long-Term Efficiency Increase in Ultra Supercritical Power Plants”

is a large-scale Integrated FP7 Project in the Energy area. It started on January 1, 2011 and will last 54 months. It is carried out by a Consortium of 24 Full-Partners, 7 Subcontractors from 10 European countries including KMM-VIN members: TUG, VTT and CSM (Centro Sviluppo Materiali - project coordinator). The total budget is 18.2 M€, with 10.7 M€ financing by the European Commission.

IMPACT – **“Innovative Materials, Design and Monitoring of Power Plant to Accommodate Carbon Capture”** (UK industry-led collaborative project) Development of advanced welded MARBN steels for USC power plant. Improved design for

welded components to reduce premature cracking. Improved strain and materials monitoring to allow high temperature operation.

CRESTA (<http://www.cresta.cc>) "**New Creep REsistant STable steel for USC Power Plant**". Consortium of 7 partners including KMM-VIN members: TUG, CSM, ALSTOM. Based on the knowledge about microstructure stability a new alloy and a weld consumable will be designed to produce a compromise between high creep strength (between T91 and T92), high oxidation/corrosion resistance and good weldability. The alloy development should be based on a new concept of alloy design and tools based on thermodynamic and kinetic modelling. The possible application in welded water wall tube-fin constructions without the Post Weld Heat Treatment (PWHT), as well as, in thick pipes manufacture and welded joints with PWHT have to be demonstrated together with the relevant mechanical and oxidation/corrosion testing.

VADPSheets "**Property oriented design of hard constituent hardness and morphology in continuously annealed/galvanized DP sheets**". Research project co-financed by RFCS is conducted by consortium composed of five European partners including KMM-VIN members: IMZ (project coordinator), AGH-UST, Saltzgitter Manesmann. The project started on 1 June 2011 and will be completed on 31 December 2014. It essentially aims at developing the predictive model capable of creating the 2D and 3D Digital Material Representation of the microstructure.

HotPipes – "**Development, manufacturing and application of a SHM-system for high energy pipes in power plants**" (EraSME project). Development of a permanently installed monitoring system with integrated high temperature safe sensors recording the mechanical-structural condition of the individual components.

NATIONAL PROJECTS OF KMM-VIN MEMBERS

NANO-4-CAR

(Spain, Basque ETORGAI Programme) – Project funded by the programme ETORGAI of the Basque Government with the budget of 4.6 M€. The consortium consists of leading companies in the automotive sector in the Basque Country (coordinator MAIER C^o) as well as several technological research centers in the area including

KMM-VIN members. CIDETEC-IK4 and TECNALIA. It is aimed at development of components and manufacturing processes for the automotive industry, through the use of nanotechnology in three technological lines of action: coatings, materials and lubricants. The main objectives of the project are the development of plastic materials with less wear under friction for structural parts, the development of anti-corrosion coatings for metal parts of the car (calipers) and the development of more effective and temperature resistant lubricants.

KomCerMet (Poland; EU Structural Funds)

"Metal-Ceramic Composites and Nocomposites for Aerospace and Automotive Industry". A Polish key project supported from the EU Structural Funds. Started in 2008, recently extended by 9 months, i.e. until 30 June 2013. Coordinated by IPPT (M. Basista), consortium of 12 partners including 5 KMM-VIN members (IPPT, ITME, IMIM, WUT, AGH-UST).

<http://www.komcermet.ippt.gov.pl>.

DegraLast - New project at IFAM

A new three-year FRAUNHOFER project involving IFAM aimed at developing iron-calcium phosphate and magnesium-calcium phosphate composite materials for degradable, load bearing bone implants. In the DegraLast consortium, IFAM will be in charge of materials development and processing of iron-calcium phosphate composites. Besides, development suitable of test systems for in vitro biocompatibility, mechanical properties and degradation behaviour will be addressed in this project. Further project partners involved in DegraLast are Fraunhofer Institute for Laser Technology (ILT), Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB) and Fraunhofer Institute for Biomedical Engineering (IBMT).

POLIMI OVERSEAS COLLABORATION

An agreement on a long-term research collaboration between **Tsinghua University**, Beijing, and POLIMI (Structural Engineering Department – **DIS**) is being elaborated. It concerns mechanical characterization of materials and diagnostic analyses of structures by inverse analysis procedures based primarily on indentation, namely:

- Structural diagnosis of structures and material characterization of structural materials based on macroindentation (DIS team involved: G. Bolzon, G. Maier, G. Novati).
- Micro- and nano-indentation tests and inverse analyses procedures in bioengineering (DIS team involved: R. Contro, D. Gastaldi, R. Lucchini, P.Vena).

COOPERATION

European Technology Platform on Advanced Engineering Materials and Technologies EuMaT

Since 2008 KMM-VIN has been providing the **EuMaT** Technology Platform with secretariat services. Also, M. Basista is serving as EuMaT Secretary General. This has, in a natural way, promoted KMM-VIN in the industrial and research communities in Europe.

KMM-VIN cooperates closely with the EuMaT Steering Committee in the “**Alliance for Materials**” (**A4M**) put forward by EuMaT and five other Technological Platforms which have materials in their domain of interests: SusChem, Manufuture, FTC (TEXTILE), ESTEP, SMR. The goal of A4M is to develop, verify and implement effective

coordination schemes of materials research across different sectors, in the frame of the EU research and innovation programmes.

KMM-VIN is a member in the consortium of the CSA FP7 project “Alliance for Materials – A value chain approach to materials research and innovation” (**MatVal**) submitted by the six core ETPs of the A4M and the European materials societies EMRS and FEMS to FP7. KMM-VIN role will mainly be in developing strategies for boosting research.

KMM-VIN RESEARCH FELLOWSHIPS and TRAININGS

Call for Research Fellowships 2012

The KMM Mobility Programme awards Research Fellowships on competitive basis for PhD-students and early stage researchers from the KMM-VIN member institutions to do research at other KMM-VIN member institutions.

The **4th call of KMM-VIN research fellowships** was closed on March 31, 2012. The submitted applications were reviewed by the Research Fellowship Committee, consisting of the Chair of the KMM-VIN Mobility Programme and of the Coordinators of the KMM-VIN Working Groups. According to the regular KMM-VIN budget 2012, six person months were granted in this call. In addition, two person months were awarded as Profs. Appendino grant (financed by POLITO). The following persons have been granted KMM-VIN Research Fellowships in the 4th call.

Applicant (Institution)	Host (Institution)	Stay (months)	Start (date)
L. Cordero Arias (FAU)*	A. Moreno (ITC)	2	12-09-01
A. Duszová (IMRSAS)	J. Morgiel (IMIM)	2	12-09-01
F. Smeacetto (POLITO)	A. Chrysanthou (UH)	0.5	12-08-24
Ch. Schlacher (TUG)	P. Mayr (TUC)	1.5	12-08-01
E. Stupak (VGTU)	G. Bolzon (POLIMI)	1	12-10-01
G. Cempura (AGH-UST)	F. Rustichelli (UNIVPM)	1	12-09-01

*) Appendino grant

KMM Summer Schools at CISM Reactivated

A one-week KMM-VIN advanced course “KMM-VIN – Skeletal Tissue Engineering Mechanics, with Links to Biology, Chemistry and Medicine” to be hosted – similarly as the KMM-NoE Summer Schools in the past – at CISM (Udine, IT) is scheduled for September 17 - 21, 2012.

The course coordinators are Ch. Hellmich (TUW) and A.R. Boccaccini (FAU); both are also coordinators of the KMM-VIN WG 3.

Biomaterials. Other lecturers of this course are: Kalpana Katti (USA), Vladimir Komlev (Russia), Damien Lacroix (Spain) and Laurence Vico (France).

Details on the course may be found at <http://www.cism.it/courses/C1211/>. and at the KMM-VIN website

PARTNER SEARCH FOR PROJECT PROPOSALS

POLITO

Partner search for new projects proposals in Biomaterials – topics from the NMP Call

GLANCE group (Glasses, Ceramics, and Composites) - Institute of Materials Engineering and Physics - **DISAT** (Applied Science and Technology Department) - Politecnico di Torino and its spin off **Bionica Tech** (see: “News from WG3. Biomaterials”) seek partners for proposals in the topics of the call NMP in Biomaterials. (For a complete description of the research activities and contact persons: <http://www.composites.polito.it>)

NMP.2013.1.2-1 Nanotechnology-based sensors for environmental monitoring

POLITO expertise: Silica-based thin film containing metallic nanocluster with biosensing activity.

NMP.2013.1.2-2 Nanotherapeutics to treat bacterial infectious diseases

POLITO expertise: •Antibacterial titanium surfaces for implantable devices; •Production and characterization of inorganic nanoparticles containing antibacterial ions; •Surface functionalization with antibacterial biological molecules; •Inorganic thin-films containing metallic nanocluster with antibacterial properties.

BIONICA TECH expertise (Bionica Tech is a spin off of the Politecnico di Torino): Production of powders (micro and nano scale) by spray dryer technique: drug particles, powders bale to vehicle a drug.

NMP.2013.1.3-1 Safety in nanoscale production and products

POLITO expertise: •Production of model nanopowders by wet chemistry; • Nano-powders characterization

BIONICA TECH expertise (Bionica Tech is a spin off of the Politecnico di Torino):

Production of model nano-powders by spray dryer technique.

NMP.2013.2.2-1 Biomaterials for Advanced Therapies and Medical Devices in the neurological/neuromuscular or cardiovascular fields

POLITO expertise: •Functionalization of cardiovascular devices; •Production of nanoparticles for biomaterial-assisted gene therapy; • Antibacterial surfaces; •Resorbable glass fibers to guide the axons growth, the fibers can be incorporated in a polymeric guide and can release growth factors.

NMP.2013.2.2-2 Biomaterials: Imaging and rapid precise prototyping technology for custom made scaffolds – coordinated call with China

POLITO expertise: Micro-CT. Equipment and know how related to osteoproduktive materials able to stimulate the bone regeneration process (these materials can be supplied to the Consortium).

NMP.2013.2.3-1 Advanced materials – our allies for a sustainable future

POLITO expertise: The DISAT (Department of Applied Science and Technology) deals with various research subjects which range from the fundamentals of physics, chemistry and materials science to the production and behaviour of engineered materials. The increasing demand for applications which call for innovative materials, specifically designed and created for solutions which are often unique. The DISAT’s aims include offering a new approach to the sector. This reflects the principles of “product engineering”: a way of integrating all the skills and knowledge involved in creating the products industry needs with the objective of material optimization for each application.

NMP.2013.4.0-3 From research to innovation: substantial steps forward in the industrial use of European intellectual assets, stimulating the use of newly developed materials and materials technologies by the industry

Coordinator - BIONICA TECH (Bionica Tech is a spin off of the Politecnico di Torino); for its expertise – see a short presentation at “News from WG3. Biomaterials.

Requested Partners: Manufacturers of orthopaedic and/or spinal surgery devices, in particular titanium screws and PMMA cements;• In vivo tests; •CE marking; •Distributors of orthopaedic or spinal surgery devices; •Multicentre clinical trials.

POLITO expertise: Characterization of prototypes.

II.4.2 "The Ocean of Tomorrow – 2013": Joining research forces to meet challenges in ocean management

POLITO expertise: Surface modification for anti-fouling materials.

POLIMI - SEARCH FOR PARTNERS IN X-RAY APPLICATIONS

At Politecnico di Milano, Department of Structural Engineering, since about 2 years we have been developing research activities concerning X-ray (micro-)CT and computational tools based on digital images, applied to material and structural mechanics, bioengineering, material science, diagnostic for the historical heritage.

These activities involve multidisciplinary interactions with Physicists, colleagues of Industrial Bioengineering, Material Science, Computer Science and, of course, Solid and Structural Mechanics.

Currently, there is a multidisciplinary group working at Politecnico di Milano in contact with other groups in Italy, and a few, high-quality contacts already activated in Europe.

We are willing to develop in the next future a European Project on this subject and are looking for partners or groups, who could be interested in developing a net for a European Proposal.

We would begin to gather possible expressions of interest.
In this perspective, any suggestion would be welcome.

*Dr Roberto Fedele, Assistant Professor of Solid Mechanics
Dipartimento Ingegneria Strutturale, Politecnico di Milano
fedele@stru.polimi.it*

PERSONALIA

Prof. Aldo R. Boccaccini (FAU)

head of the Institute of Biomaterials, has been elected the chairman of the 10th IASTED International Conference on Biomedical Engineering "BioMed 2013" to be held on February 13-15, 2013 in Innsbruck (Austria). The Chairman of the previous conference (BioMed 2011) was Prof. Christian Hellmich (TUW), a core KMM-VIN member.

Prof. Christian Hellmich (TUW)

was awarded the **2012 Walter L. Huber Civil Engineering Research Prize** *"for his contributions in the linear and nonlinear, elastic and anelastic, microporomechanics of hierarchical geomaterials*

and biomaterials, particularly concrete, wood, and bone; and their applications in geotechnical and biomedical engineering, in particular NATM tunneling and orthopedics". The Prize is awarded by the American Society of Civil Engineers (ASCE), the largest civil engineering society worldwide. It is unusual that the Prize is given outside the U.S.

Prof. Andres Díaz Lantada (UPM)

authored recently a book "Handbook of Active Materials for Medical Devices: Advances and Applications", Pan Stanford Publishing, Singapore 2012, being its editor and principal author.

KMM-VIN Members (Institutions)

CORE MEMBERS

1. **AGH-UST** AGH-University of Science and Technology, Cracow, Poland (*acronym changed*)
2. **AITEX** Textile Research Institute, Alcoy-Alicante, Spain
3. **BioIRC** Bioengineering Research and Developing Centre, Kragujevac, Serbia
4. **CIDETEC** Fundacion CIDETEC (Centre for Electrochemical Technologies), Donostia/San Sebastián, Spain
5. **CISM Lab** Centro Internazionale di Scienze Meccaniche Spin-off, Udine, Italy
6. **CUT** Cracow University of Technology, Cracow, Poland
7. **DPS** Doosan Power Systems Ltd, Crawley, UK
8. **EMINATE** Eminate Ltd, Nottingham, UK
9. **FHG** Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V
- IFAM** Fraunhofer Institute for Manufacturing and Advanced Materials, Bremen, Germany
- IFAM-DD** Fraunhofer Institute for Manufacturing and Advanced Materials, Dresden, Germany
- IWM** Fraunhofer Institute for Mechanics of Materials, Freiburg, Germany
10. **IMBAS** Institute of Mechanics, Bulgarian Academy of Sciences, Sophia, Bulgaria
11. **IMIM** Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Cracow, Poland
12. **IMRSAS** Institute of Materials Research, Slovak Academy of Sciences, Kosice, Slovakia
13. **IMZ** Institute for Ferrous Metallurgy, Gliwice, Poland
14. **INTA** Instituto Nacional de Técnica Aeroespacial, Torrejón de Ardoz, Spain
15. **IOD** Foundry Research Institute, Cracow, Poland
16. **IPM** Institute of Physics of Materials, Brno, Czech Republic
17. **IPPT** Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland
18. **IS** Instytut Spawalnictwa, Gliwice, Poland
19. **ITC** Instituto de Tecnología Cerámica - AICE, Castellón, Spain
20. **ITME** Institute of Electronic Materials Technology, Warsaw, Poland
21. **MCL** Werkstoff-Kompetenzzentrum-Leoben Forschungsgesellschaft m.b.H. (Materials Centre Leoben), Leoben, Austria
22. **MERL** Materials Engineering Research Laboratory Ltd, Hitchin, Hertfordshire, UK
23. **ONERA** Office National d'Etudes et de Recherches Aéropatiales, Chatillon, France
24. **POLIMI** Politecnico di Milano, Milano, Italy
25. **POLITO** Politecnico di Torino, Torino, Italy
26. **R-TECH** Steinbeis Advanced Risk Technologies GmbH, Stuttgart, Germany
27. **TECNALIA** Fundación Tecnalia, Donostia-San Sebastian, Spain
28. **TUD** Technische Universität Darmstadt, Darmstadt, Germany
 Department of Materials and Earth Sciences
 Institute for Materials (IfW-MPA)
29. **TUG** Graz University of Technology, Graz, Austria
30. **TUW** Technische Universität Wien, Wien, Austria
31. **UH** University of Hertfordshire, Hatfield, Herts, UK
32. **UNIPAD** Università degli Studi di Padova, Padova, Italy
33. **UNIVPM** Università Politecnica delle Marche, Ancona, Italy
34. **UPM** Universidad Politécnica de Madrid, Madrid, Spain
35. **WRUT** Wroclaw University of Technology, Wroclaw, Poland
36. **WUT** Warsaw University of Technology, Warsaw, Poland

ASSOCIATE MEMBERS

1. **ALSTOM** Alstom Power Ltd., Rugby, UK
2. **BEG** Böhler Edelstahl GmbH & Co KG, Kapfenberg, Austria
3. **BSGA** Böhler Schweißtechnik Austria GmbH, Kapfenberg, Austria
4. **BUDERUS** Buderus Edelstahl GmbH, D-35576 Wetzlar, Germany
5. **CRF** Centro Ricerche FIAT, Orbassano, Italy
6. **CSM** Centro Sviluppo Materiali S.p.A., Rome, Italy
7. **EMPA** Materials Science and Technology, Dübendorf, Switzerland
8. **E.ON** E.ON New Build & Technology Ltd., Coventry, UK
9. **ETE** Energietechnik Essen GmbH, Essen, Germany
10. **EU-VRi** European Virtual Institute for Integrated Risk Management, Stuttgart, Germany
11. **FAU** Friedrich-Alexander Universität Erlangen-Nürnberg, Germany (*acronym changed*)
12. **KEMA** KEMA Nederland BV, Arnhem, Netherlands
13. **LU** Loughborough University, Loughborough, UK
14. **MPA** Materialprüfungsanstalt Universität Stuttgart, Germany
15. **NPLML** NPL Management Limited, Teddington, UK
16. **SIEMENSTurbo** Siemens Industrial Turbomachinery AB, Finspong, Sweden
17. **SSF** Saarschmiede GmbH Freiformschmiede, Völklingen, Germany
18. **SVUM** SVÚM a.s., Prague, Czech Republic
19. **SWG** Schmiedewerke Gröditz GmbH, Gröditz, Germany
20. **SZMF** Salzgitter Mannesmann Forschung GmbH, Duisburg, Germany
21. **TUC** Chemnitz University of Technology, Chemnitz, Germany
22. **VAGL** voestalpine Giesserei Linz GmbH, Linz, Austria
23. **VG TU** Vilnius Gediminas Technical University, Vilnius, Lithuania
24. **V&MD** Vallourec & Mannesmann Tubes, V&M Deutschland GmbH, Düsseldorf, Germany
25. **VTT** VTT Technical Research Centre of Finland, Espoo, Finland
26. **VZU** Výzkumný a zkušební ústav Plzeň s.r.o., Plzeň, Czech Republic

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