

KMM-VIN for Science and Industry: A new model of European integration in Materials R&D

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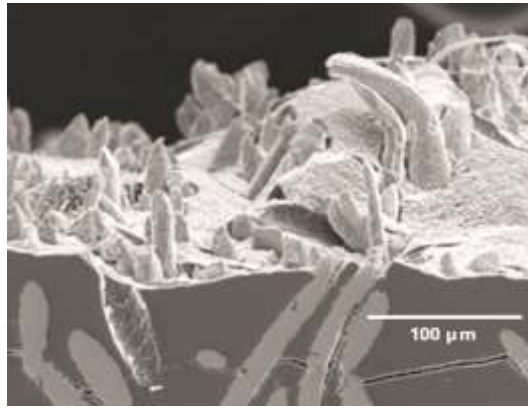
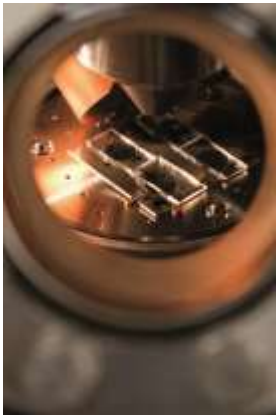


European Virtual Institute on Knowledge-based Multifunctional Materials AISBL

What is KMM-VIN?

The European Virtual Institute on Knowledge-based Multifunctional Materials

- Status: Intl' non-profit association (AISBL) established in Belgium in 2007
- Purpose: applied materials research, training and mobility activities
- Main focus: **advanced structural and functional materials**
- Main office in Brussels, Branch in Warsaw



KMM-VIN partners

The partnership (now **70**) consists of 35 core + 35 associate members



KMM-VIN mission

„To develop a **new European model of R&D&I integration** and self-sustainable cooperation of the stakeholders in the area of knowledge-based structural and functional materials, offering wide access to research, technology and development for industry via R&D projects, testing, analysis and consultancy services.”

Core competency

- metals and highly processed alloys
- innovative high temperature steels
- advanced ceramics
- intermetallics and shape memory alloys
- composites and functionally graded materials
- coatings, layered materials, surface modification
- biomaterials and bioinspired materials
- joining of advanced materials
- modelling of advanced materials



KMM-VIN Activities

- collaborative research in Working Groups
- research offerings to respond to Calls for Proposals (e.g. H2020)
- Expert-Infra Database - inventory of members' expertise and equipment
- KMM Materials Toolkit - database of materials processed by members
- networking people through KMM Mobility Programme - Research Fellowships for young researchers and PhD students
- information on funding opportunities in KMM area and events
- technological roadmaps and foresights
- publication series via KMM editorial office
- communication and management tools
- support help-desk (IPR, project management).

KMM-VIN projects (FP6, FP7 and H2020)

KMM-NoE (FP6) Network of Excellence

„Knowledge-based Multicomponent Materials for Durable and Safe Applications (2004-2009) – **origin of KMM-VIN**

MATRANS (FP7) “Micro and Nanocrystalline Functionally Graded Materials for Transport Applications” (2010-2013) - **coordinator**

INNVIN (FP7) “Innovative materials solutions for Transport, Energy and Biomedical sectors by strengthening integration and enhancing research dynamics of KMM-VIN” (2012-2015) - **coordinator**

INTeg-Risk (FP7) “Early Recognition, Monitoring and Integrated Management of Emerging, New Technologies Related, Risks.” (2008-2013) - **beneficiary**

MUST (FP7) „Multi Level Protection of Materials for Vehicles by Smart Nanocontainers” (2008-2012) - **beneficiary**

MatVal (FP7) „Alliance for materials: A value chain approach to materials research and innovation” (2012-2014) – **beneficiary**

MATCH (H2020) „The Alliance for Materials way to the creation of the MATerials Common House” (2015-2017) - **beneficiary**

Example of R&D project: MATRANS (FP7)



MATRANS „Micro and Nano-crystalline Functionally Graded Materials for Transport Applications”

FP7 cooperative R&D project (2010-2013), EU funding 3.6 M€; 16 partners (9 KMM-VIN); coordinator: KMM-VIN



THRUSTER
HVOF sprayed **FGM** (Cu-Al₂O₃)
After „hot exhaust test”



BRAKE DISC
Infiltrated **FGM** (Al₂O₃-Cu)

Motored engine head - dry test



Life engine test

KMM-VIN Mobility Programme

- Research Fellowships for PhD students and young researchers (<10 yrs after PhD)
- Fellowship of 1500 € / month to carry out research at another KMM-VIN member organisation
- Competitive call for applications open once a year
- Joint journal publications expected within 1 year after fellowship completion.

KMM-VIN Services for Industry



European Virtual Institute on Knowledge-based Multifunctional Materials AISBL

What industry sectors are targeted by KMM-VIN?

- **TRANSPORT** automotive, rail and maritime
- **AEROSPACE and AERONAUTICS**
- **ENERGY** conventional and renewable
- **HEALTH**



KMM-VIN services for Industry

- Access to R&D expertise and infrastructure across Europe
 - ✓ Expert-Infra Database - inventory of members' expertise and equipment
 - ✓ KMM Materials Toolkit - database of materials processed by members
- Industrial Workshops
- Specialised Courses
- Networking opportunities through membership of KMM-VIN
- Participation in Working Groups' internal projects

Materials Toolkit & Expert-Infra

KMM.VIN Integrated Solutions for Advanced Materials
from idea to ready product

Home TRANSPORT ENERGY HEALTH Contact

Introductory video Newsletter

ADVANCED MATERIALS for INDUSTRY and SCIENCE

The KMM-VIN (European Virtual Institute on Knowledge-based Multifunctional Materials AISBL) offers professional investigations of advanced materials designed for enhanced performance in complex loading and environmental conditions.

KMM-VIN materials and technologies comprise i.e. metals and alloys, advanced ceramics, intermetallics and shape memory alloys, composites and functionally graded materials, coatings and surface modification, biomaterials and bioinspired materials, and joining of advanced materials.

The main KMM-VIN activities and professional services are dedicated to TRANSPORT, ENERGY and HEALTH industries. KMM-VIN consists of 73 members having combined expertise in materials processing, characterisation, testing and modeling.

Cooperation options Specialised Courses
Expertise & Infrastructure Materials Toolkit

Transport

Materials for Transport in KMM-VIN comprise the materials development, testing and modeling primarily for automotive and aerospace applications. The main focus of the R&D activities is on ferrous and non-ferrous materials as well as advanced composites with metal, ceramic or polymer matrix and different forms of reinforcement.

More Info

Energy

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 also includes materials issues for energy production from renewable sources.

More Info

Health

in the field of Materials for Health, KMM-VIN has its main competencies in processing and characterisation. A broad range of powder based technologies can be offered for processing of metals and ceramics for medical devices, scaffolds and implants.

More Info

What's KMM-VIN?

KMM-VIN AISBL has emerged from the European Commission's 8th Framework Programme Network of Excellence Knowledge-based Multifunctional Materials for Durable and Safe Performance (KMM-NoE). KMM-VIN AISBL invites companies from Transport, Energy and Health sectors to establish effective cooperation on advanced materials and technologies.

More Info

KMM-VIN services for Industry

KMM.VIN EUROPEAN VIRTUAL INSTITUTE ON KNOWLEDGE-BASED MULTIFUNCTIONAL MATERIALS AISBL

Home | About Us | Members | Research | Services | Materials Toolkit | Education and Training | Publications | News | Contact

Materials Toolkit

This service is accessible for members only

The **KMM Materials Toolkit** is a catalogue of records of advanced materials which are being manufactured in the laboratories of KMM site members.

Currently, **Materials Toolkit** consists of the material groups and material records as shown below.

For more information on a specific material from **Materials Toolkit** please contact: KMM-Info@kmm-vin.eu

Metals and Alloys

- Aluminium alloy 5052
- Al 5052 after Equal Channel Angular Pressing process
- Al after Hydrostatic Compression
- Al-Cu-Mg-Mn after Hydrostatic Extrusion
- Al after Severe Plastic Deformation
- Al-0.2 alloy
- Al-Cu-Zn after Severe Plastic Deformation
- CoNiCrCu 30
- Co after Hydrostatic Compression
- Co-Cr-Zr alloy after Severe Plastic Deformation
- Co subjected to plastic deformation
- IN617
- Inconel 600 with AZ31Mg Al Multilayer
- Inconel 625 Ni alloy subjected to stretching
- Mg-440-Zn
- Mg-440-MZ magnesium alloy
- Ni-alloy after Severe Plastic Deformation
- Ni-alloy 200 after Severe Plastic Deformation
- IN600
- IN600-N

Launch Toolkit

[Launch Toolkit](#)

Membership

If you would like to join KMM site please follow the [Accession Procedure](#)

Ask KMM-VIN Service

Ask KMM-VIN is your direct line to expert help from leading organisations in the field of knowledge based structural and functional materials. [Submit Enquiry](#)

KMM-VIN

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Expertise and Infrastructure

This service is accessible for members only

Due to **Expertise and Infrastructure toolkit** (expert info database) we offer for external clients from industry, SMEs and academia a transparent access to specialised research infrastructures owned by KMM site members. The access can be made available to external clients either in person ("hands-on") or through remote services by KMM site members. If you need to conduct specialised tests on your own material samples or specific processing methods to obtain laboratory samples of an advanced structural or functional material, the **infrastructures** on our site might address it well.

The terms and conditions of an access to the relevant infrastructures will be determined on KMM site office with the KMM site member who owns the infrastructure.

The **Expertise and Infrastructure toolkit** is a single searchable database enabling the depth and breadth of assets within the KMM-VIN to be interrogated. The main areas of the tool are:

- Local expertise
- Search by host institution
- Search for a specific equipment (by name and type) - this area also include some of available testing method
- Search for services offered by our partners

[Click to enter the Expertise and Infrastructure database](#)

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R&D Structure

Joint research activities in Working Groups

WG1: MATERIALS FOR TRANSPORT

30+ members

Coordinators:

P. Egizabal (TECNALIA)

Th. Weissgaerber (FhG-IFAM)

WG2: MATERIALS FOR ENERGY

60+members

Coordinators:

Ch. Sommitsch (TU Graz)

M. Ferraris (POLITO)

WG3: BIOMATERIALS

30+ members

Coordinators:

A. Boccaccini (U. Erlangen)

Ch. Hellmich (TU Wien)

WG4: MODELLING

40+ members

Coordinators: **C. Poletti** (TU Graz) and **J. Rojek** (IPPT Warsaw)

KMM-VIN educational/training offer

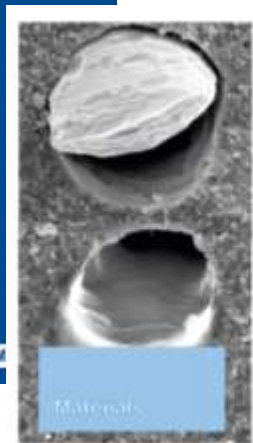
- KMM-VIN Specialized Courses
- KMM-VIN Industrial Workshops



Specialised Courses

Specific training on Materials, Processes, Characterization, Modeling and Risk Management

- **Concept:** One-day in house training or e-learning tailored to company's needs



Advanced modeling

AIMS: The aim of this course is to give attendees an in-depth understanding of the advanced options available to design

SKILLS: This course covers all the modeling techniques, including advanced finite element methods, fluid dynamics, multi-scale modeling and post-processing techniques in the engineering software. It covers the advanced techniques for the simulation of the behavior of materials under the influence of various loading conditions and the interaction of different materials.

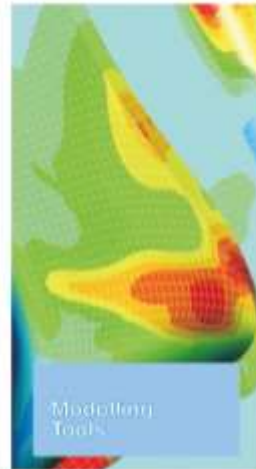
Partner: IIT
LANGUAGES: English, Italian

Simulation

AIMS: The aim of this course is to give attendees an in-depth understanding of the advanced options available to design, using engineering software.

SKILLS: To build knowledge about the advanced simulation techniques and the capabilities of the simulation software.

Partner: IIT
LANGUAGES: English, Italian



Advanced multi-scale and multi-scale material modeling

AIMS: Understand the multi-scale modeling and their influence in the mechanical simulation. Modeling of single phase and multiphase deformable solids, coating layers, composites, plastic, viscoelastic material responses, as well as damage and residual stress analysis. Consider the multi-scale modeling, including single engineering applications, ranging from prediction of local-scale structures and devices to large structural problems.

Partner: IIT
LANGUAGES: English, Italian

Simulation and damage models

AIMS: Present the formulation of constitutive behavior of different class of materials based

SKILLS: Knowledge and use to structural and constitutive models for elastic, viscoplastic

Partner: IIT
LANGUAGES: English, Italian

Damage and fracture mechanics

AIMS: Present the mathematical formulation of the damage and fracture mechanics

SKILLS: Develop the capability of using the finite element method to simulate the damage and fracture

Partner: IIT
LANGUAGES: English, Italian



Advanced data analysis

AIMS: Understand the data of material and process data to extract the information and design

SKILLS: Develop the capability of using the data analysis software to extract the information and design

Partner: IIT
LANGUAGES: English, Italian

Advanced modeling

AIMS: Understand the data of material and process data to extract the information and design

SKILLS: Develop the capability of using the data analysis software to extract the information and design

Partner: IIT
LANGUAGES: English, Italian

Production Processes

AIMS: Understand the data of material and process data to extract the information and design

SKILLS: Develop the capability of using the data analysis software to extract the information and design

Partner: IIT
LANGUAGES: English, Italian

Production Processes

AIMS: Understand the data of material and process data to extract the information and design

SKILLS: Develop the capability of using the data analysis software to extract the information and design

Partner: IIT
LANGUAGES: English, Italian

“Specialised Courses 2015” on www.kmm-vin.eu

Industrial Workshops



IW1: „Materials for Energy“
10-11 July 2013, Madrid



IW2: „Current Research, Industrial and Clinical Issues in Bone Implant Development“
21-22 May 2014, Bremen



IW3: „Current Research on Materials and Technologies for Transport Application“
3-4 Nov. 2014, Dresden



IW4: „Advanced Materials Modelling for Industrial Applications“
30 Jan. 2015, Graz

**Thank you very much for
your attention !**