

Interest Group (IG)

10.2: “Pioneer Nanomaterials for Aerospace Applications”

(Area of Interest 10: "Innovative concepts and scenarios")

IG Leader:

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Polytechnic University of Marche *Dept. SAIFET – Physical Sciences Section*

Research area: materials science in a wide range of applications (biology/medicine, cultural heritage, ..., aerospace)

in particular: characterization by neutron and X-ray/synchrotron radiation techniques

- Neutron/X-ray diffraction for residual stress determination
- Microstructural characterization (defects, precipitates, particles, voids, ...) by
 - small angle scattering of neutrons (SANS) or X-rays (SAXS)
 - neutron radiography/tomography and synchrotron radiation microtomography



Polytechnic University of Marche *Dept. SAIFET – Physical Sciences Section*

- Regular access to European Large Scale Facilities (neutron and synchrotron radiation sources)
- Home facilities: XRD, SEM/TEM, AFM

European Aeronautics Science Network



Present IG members

	Name	Institution/organisation	email
1	Prof. Gianni Albertini	Polytech. Univ. of Marche, IT	gialbe@univpm.it
2	Prof. Vassilis Kostopoulos	University of Patras, GR	kostopoulos@mech.upatras.gr
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4	Prof. Gabriella Bolzon	Polytechnic of Milan, IT	gabriella.bolzon@polimi.it
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6	Prof. Christian Hellmich	Technical Univ. of Wien, AT	Christian.Hellmich@tuwien.ac.at
7	Prof. Monica Ferraris	Polytechnic of Turin, IT	monica.ferraris@polito.it
8	Prof. Aleksandra Czyrska-Filemonowicz	AGH University of Science and Technology, Krakow, PL	czyrska@uci.agh.edu.pl
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10	Prof. Han Zhao	University Pierre & Marie Curie (Paris 6), FR	zhao@lmt.ens-cachan.fr
11	Prof. Jan Dusza	Inst. of Materials Res., Slovak Academy of Sciences, SK	jdusza@imr.saske.sk

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Present IG members

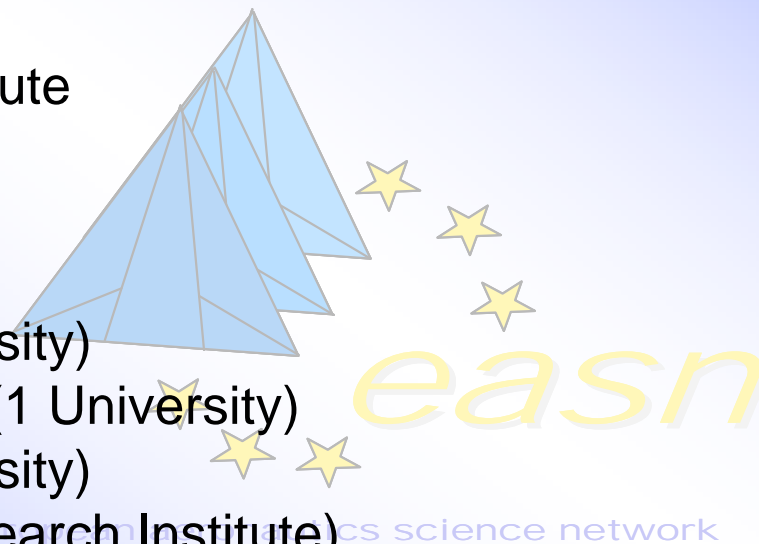
12	Prof. Jerzy Morgiel	Inst. of Metallurgy and Materials Science, Polish Acad. of Science, Krakow, PL	nmmorgie@imim-pan.krakow.pl
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21	Dr. Hans-Jurgen Grande	CIDETEC, San Sebastian, SP	hgrande@cidetec.es

Present IG members

- 13 Universities
- 1 Research Institute
- 5 Industries

from:

- Austria (1 University)
- Czech Republic (1 University)
- France (1 University)
- Germany (1 Research Institute)
- Greece (1 University)
- Italy (3 Universities, 1 Industry)
- Poland (3 Universities)
- Slovakia (1 University)
- Spain (1 University, 2 Industries)
- United Kingdom (1 University, 2 Industries)



- This IG is established in order to collect and exchange information and expertise at an European level, concerning novel nanotechnologies and nanomaterials for applications in aerospace technology.
- The IG **main goals** can be:
 - i) to verify if **already existing nanotechnologies and nanomaterials**, presently applied to other technological fields, can find applications in aerospace industry;
 - ii) to explore **new materials, routes and methods** to produce nanomaterials for aerospace applications;
 - iii) to assess **advanced numerical and experimental methods** for the thermo-mechanical and microstructural characterization of nanomaterials and of their performances with respect to aerospace applications.
 - iv) open to other **suggestions**
- As for other IG's, also this one should lead to the gathering of partners in order to to prepare University-driven European Projects.

Nanomaterials in aircrafts and spacecrafts

Examples:

- polymer-based composites (CNT- or nanoparticle reinforcements)
- nanostructured metallic alloys and MMC's (mainly Al- and Ti-based);
Hall-Petch law: as metal grain size decreases, strength increases
- nanophase ceramics with enhanced ductility and strength

To obtain:

- ultra high strength-to-weight ratio
- improved hardness and wear resistance
- thermal shock, fatigue and creep resistance
- impact resistance
- nanocoatings on aircraft engine blades and as structure protectors of spacecrafts
- electrical/electronic components
- enhanced anti-microbial activity
- etc...

Visionary ideas:

e.g.: **self-healing materials**. It has been shown that nanoparticles dispersed throughout a material can migrate to cracks, potentially giving rise to self-healing composites (if sufficient migration occurs to seal cracks).

European Aeronautics Science Network



Proposal : 233899
Acronym : ADEFCO
Program : FP7
Call : FP7-AAT-2008-RTD-1
Funding scheme : Small or medium-scale focused research project - CP-FP
Duration : 48 months
Activity : 2008.7.1.1 - Greening

ADEFCO
 ADVANCED ENVIRONMENTALLY FRIENDLY COATINGS FOR THE AERONAUTICS
 INDUSTRY

Proposal submitted by :

N°	Proposer name	Country	Total cost (€)	%	Grant requested (€)	%
1	CERAMICS AND REFRACTORIES TECHNOLOGICAL DEVELOPMENT COMPANY S.A.	Greece	1,033,200	14.76	800,400	15.89
2	HELLENIC AEROSPACE INDUSTRY S.A.	Greece	502,000	7.17	256,000	5.08
3	UNIVERSITY OF PATRAS	Greece	203,760	2.91	154,320	3.06
4	PYROGENESIS SA	Greece	414,000	5.91	299,200	5.94
5	Università Politecnica delle Marche	Italy	438,000	6.26	330,000	6.55
6	MBN Nanomaterialia S.p.A.	Italy	405,800	5.80	286,360	5.69
7	PLASMA JET	Romania	350,000	5.00	228,560	4.54
8	UNIVERSITAT DE BARCELONA	Spain	479,400	6.85	361,800	7.18
9	FUNDACIÓN CIDETEC	Spain	500,908	7.15	369,530	7.34
10	TRAITEMENTS COMPOSITES POUDRES ET PROCESS	France	369,200	5.27	254,800	5.06
11	Southside Thermal Sciences (STS) Ltd.	United Kingdom	600,550	8.58	421,694	8.37
12	Cranfield University	United Kingdom	585,400	8.36	429,400	8.52
13	Materials Engineering Research Laboratory Ltd	United Kingdom	436,700	6.24	329,775	6.55
14	Imperial College London	United Kingdom	382,000	5.46	288,000	5.72
15	Institute of Surface Chemistry of the National Academy of Sciences of Ukraine	Ukraine	301,000	4.30	227,250	4.51
	Total		7,001,918	100%	5,037,089	100%

Final evaluation: 11

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Micro and Nanocrystalline Functionally Graded Materials for Transport Applications

MATRANS

Call identifier FP7-NMP-2008-SMALL-2

List of participants:

Participant no.	Participant organisation name	Short name	Type	Country
1 Coordinator	European Virtual Institute on Knowledge-based Multifunctional Materials AISBL (KMM-VIN)*	KMM-VIN	OTH	Belgium
2	Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung	FRAUNHOFER	RES	Germany
3	National Technical University of Athens	NTUA	HE	Greece
4	Wroclaw University of Technology	WRUT	HE	Poland
5	Institute of Materials and Machine Mechanics, Slovak Academy of Sciences	IMSAS	RES	Slovakia
6	Cardiff University	CU	HE	UK
7	EADS Deutschland GmbH	EADS	IND	Germany
8	TRW Automotive GmbH	TRW	IND	Germany
9	Centro Ricerche FIAT	CRF	IND	Italy
10	Steinbeis Advanced Risk Technologies GmbH	R-TECH	IND / SME	Germany

KMM-VIN is a grouping according to FP7 definition, including in the MATRANS project the following core members:

1. Institute of Electronic Materials Technology (ITME), Poland; RES
2. Institute of Fundamental Technological Research, Polish Academy of Sciences (IPPT), Poland; RES
3. Institute of Metallurgy and Materials Science, Polish Academy of Sciences (IMIM), Poland; RES
4. Technische Universität Darmstadt (TUD), Germany; HE
5. Politecnico di Torino (POLITO), Italy; HE
6. Università Politecnica delle Marche (UNIVPM), Italy; HE