M-ERA.NET Call 2020:
List of projects recommended for funding

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Modeling for materials engineering and processing	DeeMa	Design and Optimisation Open Innovation HUB for Composites Modeling and Design	4	Luxembourg Institute of Science and Technology (LU) Czech Technical University in Prague (CZ) **e-Xstream Engineering (LU)* DataSentics (CZ)	FNR (Luxembourg) TACR (Czech Republic)
Modeling for materials engineering and processing	EMMA	Exploring Multi-Method Analysis of composite structures and joints under consideration of uncertainties during engineering and processing	4	Aeronautics Institute of Technology (BR) German Aerospace Center (DE) Riga Technical University (LV) Ikskile Centre of Composite Competence (LV)	FAPESP (Brazil, Sao Paulo) SMWK (Germany, Saxony) VIAA (Latvia)
Modeling for materials engineering and processing	MIST	MultI-Scale Simulation Toolbox	3	University of Namur (BE) AGC-Plasma (BE) PlasmaSolve (CZ)	SPW (Belgium, Wallonia) TACR (Czech Republic)
Modeling for materials engineering and processing	NanoBainControl	Accelerated nanobainitic transformation in low-alloy steels processed by incremental forging.	3	TU Bergakademie Freiberg (DE) Politechnika Slaska (PL) Akademia Gorniczo-Hutnicza (PL)	SMWK (Germany, Saxony) NCN (Poland)
Innovative surfaces, coatings and interfaces	ADVENTURE	Advanced coating substrate preparation by shifted and ultrafast laser texturing	4	University of West Bohemia (CZ) Laserinstitut Hochshule Mittweida (DE) Research and Testing Institute Pilsen (CZ) Institute of Plasma Physics of CAS (CZ)	TACR (Czech Republic) SMWK (Germany, Saxony)
Innovative surfaces, coatings and interfaces	ANSOLCO	ANti-SOiLing COating for heliostats	3	RIOGLASS SOLAR S.A.U (ES) BRIGHTSOURCE INDUSTRIES LTD (IL) HEBREW UNIVERSITY OF JERUSALEM (IL)	IDEPA (Spain) IIA (Israel) MOST (Israel)

[1] Participants requesting no funding are marked with an asterisk and printed *in italc type*.

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Innovative surfaces, coatings and interfaces	AntiPathCoat	New generation copper based coatings of improved antimicrobial resistance to pathogens	3	Institute of Metallurgy and Materials Science, Polish Academy of Sciences (PL) Institute of Metal Science, Equipment, and Technologies with Center for Hydro- and Aerodynamics, Bulgarian Academy of Sciences (BG) Manufacturer of Surgical and Medical Instruments CHIRMED (PL)	NCBiR (Poland) BNSF (Bulgaria)
Innovative surfaces, coatings and interfaces	BioAFC	Biotechnological Anti Freezing Coating	4	Kansai Altan Boya Sanayi ve Ticaret A.Ş. (TR) Sabancı Üniversitesi Nanoteknoloji Araştırma ve Uygulama Merkezi - SUNUM (TR) Vestel Beyaz Eşya A.Ş. (TR) Kaunas University of Technology (LT)	Tübitak (Turkey) RCL (Lithuania)
Innovative surfaces, coatings and interfaces	CaFeOx	Earth abundant Ca-Fe-oxide-based materials with tailored antimicrobial functionalities for diverse applications on surface, in water and membranes	3	Riga Technical University (LV) Leibniz-Institut für Polymerforschung Dresden e. V. (DE) Sia Management Service Company (LV)	VIAA (Latvia) SMWK (Germany, Saxony)
Innovative surfaces, coatings and interfaces	HybbiStent	Hybrid biodegradable coating for one-wire peripheral nitinol stent for prevention of restenosis and plaque formation	5	Fraunhofer Institute for Ceramic Technologies and Systems IKTS (DE) BALTON Ltd. (PL) NanoPrime (PL) MAT PlasMATec, Einzelunternehmen (DE) University of Latvia (LV)	SMWK (Germany, Saxony) NCBiR (Poland) NCBiR (Poland) SMWK (Germany, Saxony) VIAA Latvia)
Innovative surfaces, coatings and interfaces	LUBRICOAT	Simulation-aided design of solid lubricant coatings	7	Czech Technical University in Prague (CZ) AdvaMat s.r.o. (CZ) Fraunhofer-Institut für Werkstoff und Strahltechnik IWS (DE) TUD - Technische Universität Dresden (DE) Theegarten-Pactec (DE) SHUTON, S.A. (ES) AZOLGAS, S.A. (ES)	CZ-TACR SMWK (Germany, Saxony) EJ-GV/Innobasque (Spain, Basque Country)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Innovative surfaces, coatings and interfaces	NiWRe-Alloys	Electroplating NiW and NiRe alloys as functional alternative coatings	6	University of Applied Sciences Mittweida (DE) Institut für Korrosionsschutz Dresden GmbH (DE) Extreme Light Infrastructure Nuclear Physics/Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (RO) Stellenbosch University CT Facility (ZA) **CMF Oberflächen-design GmbH (DE)* **Microworks GmbH (DE)*	SMWK (Germany, Saxony) UEFISCDI (Romania) DST (South Africa)
Innovative surfaces, coatings and interfaces	proTool	Oxide-resistant tungsten carbide high-temperature forming tools by innovative coatings and mechanical interface manipulation	3	Fraunhofer Institute for Machine Tools and Forming Technology IWU (DE) Westsächsische Hochschule Zwickau (DE) University of Applied Science CIE Legazpi (ES)	SMWK (Germany, Saxony) EJ-GV/Innobasque (Spain, Basque Country
Innovative surfaces, coatings and interfaces	SLIM-FIT	Stable and safe Lithium-Metal / Sulfur Batteries enabled by carbon felt current collectors and advanced interface technologies	4	Fraunhofer IWS (DE) Tortech Nano (IL) TU Dresden (DE) ETV Energy (IL)	SMWK (Germany, Saxony) IIA (Israel)
High performance composites	CARBOBRAKE	Development of a Thick-walled Carbon Fiber Reinforced Brake Caliper for High Performance Automotive Applications	9	Université de Liège - CM3 (BE) iPoint Austria (AT) Graz University of Technology - Institute of Automotive Engineering (AT) JKU Linz IPPE (AT) Hintsteiner Group (AT) Fagor Arrasate (ES) RUIMOLDES (ES)	SPW (Belgium, Wallonia) FFG (Austria) GV/Innobasque (Spain, Basque Country)
High performance composites	COM®TRANS	Composites based on compositionally complex alloys for transportation industry	4	Fraunhofer IFAM Dresden (DE) National Research&Development Institute for Non-ferrous and Rare Metals – IMNR (RO) **Sigma Material GmbH (DE)* Rancon SRL (RO)	SMWK (Germany, Saxony) UEFISCDI (Romania)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
High performance composites	CORE-PV	COmposite materials and multifunctional coatings with improved performance and REcyclability for integrated PV applications	6	BRANKA SOLUTIONS S.L.U. (ES) MUGAPE S.L (ES) **ARKEMA (FR)* Association pour le developpement de l'enseignement et des recherches aupres des universites, des centres de recherche et des entreprises d'aquitaine (ADERA)- Plateforme Canoe (FR) SARL Sacha (EBIKE Port) (FR) Altenatives Energies (FR)	GV/Innobasque (Spain, Basque Country) RNAQ (France, Nouvelle Aquitaine)
High performance composites	LITAPROP	Light-weight composite structures with tailored mechanical, electrical and thermal properties	3	Technische Universität Dresden, Institute of Lightweight Engineering and Polymer Technology (DE) Warsaw University of Technology, Faculty of Material Science and Engineering (PL) TMBK Partners Sp. z. o. o. (PL)	SMWK (Germany, Saxony) NCBiR (Poland)
High performance composites	MOFAC2CAP	Development of Novel MOF Aerogel Composites to CAPture CO2	3	Ecole Normale Supérieure (FR) Turkish Petroleum Refineries Corporation (Tupras) (TR) Koç University (TR)	ANR (France) Tübitak (Turkey)
High performance composites	PlasmaComp	Plasma-polymerized functional bio-based composite coatings	4	Kompetenzzentrum Holz GmbH - Wood K plus (AT) Luxembourg Institute of Science and Technology (LU) Mondi Release Liner Austria GmbH (AT) Kästle GmbH (AT)	FFG (Austria) FNR (Luxembourg)
High performance composites	SAFFIA	Sustainable and thermally Amplified Felts and Foams. Innovative Application of reactively extruded biobased nanocomposites	3	TOFAS (TR) LIST (LU) FLOKSER (TR)	Tübitak (Turkey) FNR (Luxembourg)

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Functional materials	AMAZE	Advanced Manufacturing of Zn electrodes for Rechargeable Zn-air Batteries	3	SINTEF AS (NO) EASYL SA (FR) Izmir Institute of Technology (IZTECH) (TR)	RCN (Norway) ANR (France) Tübitak (Turkey)
Functional materials	CatWatSplit	Multiscale computer modelling, synthesis and rational design of photo(electro)catalysts for efficient visible-light-driven seawater splitting	3	Institute of Solid State Physics University of Latvia (LV) National Taipei University of Technology (TW) Center for Physical Sciences and Technology (LT)	VIAA (Latvia) MOST (Taiwan) RCL (Lithuania)
Functional materials	INSTEAD	Study of InNovative compoSite Thin films based on metallic nanowire nEtworks and functional oxides for application in smArt winDows	4	Grenoble INP/LMGP (FR) Middle East Technical University (TR) CNRS Bordeaux (FR) Liège University (BE)	ANR (France) Tübitak (Turkey) FNRS (Belgium, French Speaking Community)
Functional materials	LaSensA	2D regular nanostructures for lasing and sensing applications	5	Kaunas University of Technology (LT) Leibniz-Institut für Polymerforschung Dresden e.V. (IPF Dresden) (DE) NanoBioMedical Centre, Adam Mickiewicz University (PL) * *National Institute for Materials Science - NIMS (JP)* Nanoversa (LT)	RCL (Lithuania) SMWK (Germany, Saxony) NCN (Poland)
Functional materials	MOGLiS	MOF@rGO-based cathodes for Li-S Batteries	3	Warsaw University of Technology (PL) Norwegian University of Science and Technology (NO) SINTEF Industry (NO)	NCN (Poland) RCN (Norway)
Functional materials	SLiCE	Development of novel single Li-ion conducting polymer electrolytes for flexible and safe solid-state batteries	3	3DBattery (IL) SPECIFIC POLYMERS (FR) Noked Lab, Bar Ilan University (IL)	IIA (Israel) ANR (France) MOST (Israel)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Functional materials	SmartEnergy	Piezoelectric Energy Source for Smart Factory Applications	6	National Institute for Research and Development in Microtechnologies (RO) Łukasiewicz Instytut Technologii Elektronowej (PL) École Polytechnique Fédérale de Lausanne (CH) Center for Corporate Responsibility and Sustainability @ University of Zürich (CH) Medbryt sp. z o.o. (PL) Renault Technologie Roumanie (RO)	UEFISCDI (Romania) NCBiR (Poland) Innosuisse (Switzerland)
Functional materials	SmartHouB	Smart lightweight functionalized materials for Housing of Batteries	4	Technical University of Chemnitz (DE) İzmir Katip Çelebi University (TR) University of Sao Paolo (BR) **Bevi Plastic Ltda.(BR)*	SMWK (Germany, Saxony) Tübitak (Turkey) FAPESP (Brazil, Sao Paulo)
Functional materials	SMICE-Li	Stabilising Conversion Anodes with Solid Molecular Ionic Composite Electolytes for Solid State Lithium Ion Batteries	3	SINTEF AS (NO) National Research & Development Institute for Cryogenics and Isotopic Technologies (ICSI Rm. Valcea) (RO) ICGM Montpellier (FR)	RCN (Norway) UEFISCDI (Romania) ANR (France)
Functional materials	SWIPE	Spectroscopy of Spin Waves In Perovskite Excited states	3	University of Liege (BE) University of Luxembourg (LU) UMR CNRS Thales (FR)	FNRS (Belgium, French Speaking Community) FNR (Luxembourg) ANR (France)
Functional materials	TAGGED	Research, Development and characterization of a TunAble Graphene liGht Emitting hybrid MOEMS Device	4	Fraunhofer ENAS (DE) J. Heyrovsky Institute of Physical Chemistry (CZ) Institute of Electronic Materials Technology (PL) TU Bergakademie Freiberg (DE)	SMWK (Germany, Saxony) CZ-TACR NCN (Poland)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Functional materials	ULTCC6G_EPac	Ultra-Low Temperature Co-fired Ceramics for 6th Generation Electronic Packaging	5	Fraunhofer-Institut für Keramische Technologien und Systeme (IKTS) (DE) Lukasiewicz-Instytut Mikroelektroniki I Fotoniki (L-IMiF) (PL) Laboratoire d'électronique des technologies de l'information (CEA Leti) (FR) QWED (PL) INOVEOS (FR)	SMWK (Germany, Saxony) NCBiR (Poland) ANR (France)
New strategies for advanced material-based technologies in health applications	3D4D2	3D polymer matrix device for dual drug delivery and simultaneous treatment of acute malaria and malaria transmission	6	Leibniz-Institut für Polymerforschung Dresden e.V. (DE) Sofia University (BG) Stellenbosch University (ZA) University of Pretoria (ZA) University of Witwatersrand (ZA) University of Leipzig Medical Center (DE)	SMWK (Germany, Saxony) BNSF (Bulgaria) DST (South Africa)
Materials for Additive Manufacturing	ALF3	Additive Manufacturing of Aluminium by Means of Fused Filament Fabrication	3	Montanuniversität Leoben (AT) RHP-Technology GmbH (AT) Fraunhofer IFAM Dresden (DE)	FFG (Austria) SMWK (Germany, Saxony)
Materials for Additive Manufacturing	DePriSS	Development of “3D print-thermal spray” systems for applications with dynamic and impact loading	5	Research and Testing Institute Plzeň (CZ) University of West Bohemia (CZ) Fraunhofer- Institut für Keramische Technologien und Systeme IKTS (DE) Institute of Scientific Instruments of Czech Academy of Science (CZ) Opole University of Technology (PL)	CZ-TACR SMWK (Germany, Saxony) NCN (Poland)
Materials for Additive Manufacturing	Glass3D	Shaping Glass in the 21st Century: Additive Manufacturing of Transparent Glass Objects	3	TU Bergakademie Freiberg (DE) Hebrew University of Jerusalem (IL) TU Bergakademie Freiberg (DE)	SMWK (Germany, Saxony) MOST (Israel)
Materials for Additive Manufacturing	NovMat-AM	Novel metallic materials, feedstock and fabrication processes for high-performance additive manufactured goods	3	Fraunhofer IWS (DE) UCLouvain (BE) LaserCo (BE)	SMWK (Germany, Saxony) SPW (Belgium, Wallonia)

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Materials for Additive Manufacturing	RePoParts	Additive manufacturing Parts and Coatings using Recycled Powder from waste	6	Siec Badawcza Lukasiewicz - Krakowski Instytut Technologiczny (PL) Progresja (PL) GESCRAP (ES) DELASER (ES) STERN (ES) **University de La Rochelle (FR)*	NCBiR (Poland) GV/Innobasque (Spain, Basque Country)
Materials for Additive Manufacturing	SEBM-WC-Co	Additive Manufacturing of Hard Metals by SEBM	3	University of the Witwatersrand (ZA) IFAM Dresden (DE) Ultramat SA (ZA)	DST (South Africa) SMWK (Germany, Saxony)
Materials for Additive Manufacturing	ShapeAM	On-the-fly laser beam shaping for Laser Metal Deposition of crack-sensitive Al-Ti alloys	3	Fraunhofer IWS (DE) CIVAN Advanced Technologies (IL) A. Kotliar Engineering & Computer Services ltd. (IL)	SMWK (Germany, Saxony) IIA (Israel)
Materials for Additive Manufacturing	WReMo	Powder feedstock production and 3D printing of refractory metals and alloys for aerospace applications	5	Sieć Badawcza Łukasiewicz – Instytut Metali Nieżelaznych (PL) École de Technologie Supérieure (CA) PyroGenesis Canada Inc. (CA) Université de Sherbrooke (CA) Progresja S.A. (PL)	NCBiR (Poland) PRIMA (Canada, Québec)

Publishable abstract of the projects:

3D4D2

3D polymer matrix device for dual drug delivery and simultaneous treatment of acute malaria and malaria transmission

Malaria causes millions of deaths and poses significant economic challenges worldwide. There is an urgent need to improve malaria treatment by simplifying the administration of drugs and to make it patient friendly to the malaria-affected population, especially for people in poverty-associated regions. The current proposal aims to develop a novel injectable 3D polymer scaffold with controlled dual-drug release to sustainably provide therapeutic antimalarial drugs needed to treat acute malaria disease as well as to block the transmission of the malaria parasite to the vector mosquitoes. The device will be applied only once via an intradermal injection and will release two different drugs, each one encapsulated in a custom-made nanoparticle delivery system. This will enable a significant progress in the application of functional systems able to release concomitantly two drugs with different release profiles, making at the same time their uptake patient friendly and easily applicable.

ADVENTURE

Advanced coating substrate preparation by shifted and ultrafast laser texturing

Thermal spray (TS) coating technology enables creation of functional surfaces with excellent properties for wide range of applications and products. Currently, grit blasting is standard for TS substrate preparation, but it is limited by low reproducibility, residues causing functional failure, substrate materials and production of dust. The ADVENTURE project aims to strengthen the TS technology by introducing laser surface texturing (LST) for substrate preparation as clean, flexible and reproducible method. The goals are up-scaling of LST method, development of innovative coating-substrate interfaces and functional testing in TS. Potential applications of the project results are in high added-value components, i.e., for space, aircraft, medical or power industry. Project´s impact will be high productivity and reliability of LST, improved adhesion, lifetime and reliability of coated parts, new coating possibilities and reduced dust pollution and grit material consumption.

ALF3

Additive Manufacturing of Aluminium by Means of Fused Filament Fabrication

The primary goal of the project AlF3 is to develop Fused Filament Fabrication – FFF technique for the additive manufacturing of aluminium parts (Al-FFF). This eliminates the drawbacks of existing routes for additive manufacturing of aluminium like SLM (e.g. high cost, handling of powder) and opens new design options as the production of closed cavities and multi-material parts, for e.g. the combination of wear resistant and tough aluminium alloys. Further, high-performance alloys (precipitation hardening alloys, Metal Matrix Composites – MMC) can be employed. A new feedstock is developed integrating the

requirements of the whole process chain together with the related printing, debinding and sintering processes. On the base of concrete use cases the feasibility of the new process is investigated and proven. The whole project and especially the use cases are supervised by the Advisory Board, which should secure the later transfer of the project results into innovations.

AMAZE

Advanced Manufacturing of Zn electrodes for Rechargeable Zn-air Batteries

Zinc-air batteries (ZABs) have significant advantages compared to state-of-the-art Li-ion batteries (LIBs) due to high theoretical specific energy (1086 Wh kg-1), low cost, low toxicity, safe operation, and more sustainable nature owing to abundancy and recyclability. For ZABs to become viable alternatives to LIBs for stationary storage their cycling stability, and energy storage capacity needs to be significantly improved. The primary objective of the AMAZE project is to develop scalable and techno-economically viable methods for the manufacturing of porous Zn electrodes with excellent electrochemical performance and cycling stability in an alkaline rechargeable ZAB configuration with carbon-free bifunctional air electrode (BAE). AMAZE will contribute to reducing our dependence on oil, gas, and coal, as the intermittent energy from renewable sources, e.g., solar, can be stored in the developed next-generation ZABs, with long-term stability.

ANSOLCO

ANti-SOiLing COating for heliostats

One of the main problems of CSP plants located in arid areas with lack of water is soiling, which drastically decreases the mirror reflectance. The optical performance of the heliostats is a key factor to achieving low electricity costs: a 1% decrease in reflectance directly leads to 1% increase in the cost of electricity generated. Moreover, cleaning heliostats uses 10% of the water consumption in a CSP plant.

ANSOLCO project aims to develop a low cost and durable anti-soiling coating based on sol-gel for heliostats, with the objective of reducing the water consumption and number of maintenance operations, and increasing the electricity production of the plant. The ANSOLCO coatings will reduce the need for cleaning by 40% and increase the average reflectance by 4% in locations with major soiling problems. The water consumption for cleaning at CSP plants is expected to drop by 45% with the anti-soiling coatings, with reduction in both of cleaning operations frequency and labour costs.

AntiPathCoat

New generation copper based coatings of improved antimicrobial resistance to pathogens

AntiPathCoat aims at finding new copper based coatings of enhanced functional properties, which by reducing the number of bacterial and viral infections cases responding to global trend of illnesses prevention instead of their medical treatment. The innovation objective is the diminishing viability of pathogens on the coated surfaces, obtained in relatively easy to be implemented plating technology with the use of environmentally friendly reagents. Successfully meeting

these objectives involves Polish and Bulgarian research laboratories using three plating technologies: electroless-, electro- and selective- plating to produce copper and copper based coatings with TiO2 and ZnO particles. In strict synergy with the industrial partner, designed coatings will cover the surgical and laboratory tools. Outcomes of the AntiPathCoat project can find implementation in production of variety of items, commonly touched by people, which is an effective barrier to pathogens infection spread.

BioAFC

Biotechnological Anti Freezing Coating

Ice formation on industrial machinery is one of the inevitable occurrences,which challenge the system performance and efficiency. Ice formation on working surfaces hinders energy efficiency and safety in many applications. BioAFC aims to employ natural occurring anti-freezing proteins (AFPs) to protect various industrial surfaces. Potential application could be mentioned as wings (aviation, pavements (transportation, and evaporators (refrigeration-the target of this project). The goal is to upscale from TRL2 to TRL5. We aim to use the genetically produced AFPs and characterize the anti-icing activities, to develop a facile coating method, and to optimize the coating process via novel acoustic surface monitoring technique. BioAFC will result in economic benefit for costumers and relevant industries and will offer 5% reduction in energy consumption (105K tons/yr of CO2 emission reduction). The output is new generation of biologically coating to accelerate the energy efficiency globally.

CaFeOx

Earth abundant Ca-Fe-oxide-based materials with tailored antimicrobial functionalities for diverse applications on surface, in water and membranes

Due to the increase in microbial resistance and survival after biocide treatments, there is a strong interest in nanomaterials exhibiting antimicrobial activity in coatings and membrane filtration. Currently, the highest recognizability is seen in various photocatalytic materials that require light irradiation to be efficient. The Ca-Fe oxide nanopowders synthesized within CaFeOx exhibit very high antimicrobial activity in dark by using much cheaper, earth-abundant, non-toxic materials synthesized by more straightforward scalable approaches. Apart from synthesis and further improvement in the antimicrobial efficiency through doping and well controlled non-stoichimetry, the nanopowders will be applied and evaluated for water disinfection, as well as for coatings on polymer membranes to prevent fouling. The efficiency and biofouling potential will be tested in laboratory scale pilot systems, validated at an industrial level and assessed for their commercialization potential.

CARBOBRAKE

Development of a Thick-walled Carbon Fiber Reinforced Brake Caliper for High Performance Automotive Applications

Carbon Fibre Reinforced Polymer CFRP materials have the potential to meet high structure-mechanical and complex functional requirements, improving efficiency of lightweight structures. However:

-Thick-walled composite components are required but exhibit manufacturing defects;

-Complex components limit the possibilities for a cost-efficient manufacturing;
-Recycled high performance CFRP is a need for environment and society;
-Loading conditions (thermomechanics, acoustics) are complex.

This project develops an integrated computational approach to optimise the process and design of thick-walled composite components, by

-Combining high pressure SMC process and autoclave curing for cost efficiency;
-Developing a process simulation tool dedicated to thick-walled components;
-Developing data-driven stochastic multi-scale simulation tools for complex components;
-Implementing a comprehensive life cycle analysis to drive the selections;
-Considering a composite brake calliper as demonstrator

CatWatSplit

Multiscale computer modelling, synthesis and rational design of photo(electro)catalysts for efficient visible-light-driven seawater splitting

In this project main focus is given to performance of the photo(electro)catalysts in chlorine containing solutions in order to approach the conditions of photoelectrochemical splitting of sea water, a subject which has been little explored so far. The project aims at development of a set of techniques starting from synthesis of catalytic materials based on atomistic modeling to fabrication of seawater splitting device prototype. The experimental investigations will be based on the computer modeling of hydrogen, oxygen, and chlorine evolution reactions and theoretical characterizations of the photo(electro)catalysts. Benefiting from strong synergies with contemporary research efforts in photocatalysis, electrocatalysis, and computational materials science this project will result in improvements in efficiency, durability, and, consequently, in the cost of photoelectrochemical reactors allowing efficient production of hydrogen and chlorine-based disinfectants from sea water.

COM®TRANS

Composites based on compositionally complex alloys for transportation industry

The goal of the project is the development of new metal matrix composites based on light weight compositionally complex alloys (CCA) and ceramic particle reinforcement for brake systems in transportation industry. The new matrix alloy will provide increased strength and higher temperature operation for the developed composite material. The technology based on the new composites will provide solutions for the replacement of conventional methods by addressing main issues: maximize the operation efficiency, lower the fabrication costs and lower the polluting emissions. The newly developed materials will present high strength and stiffness to weight-ratio and will be easily recyclable. The project will cover TRL 3 and TRL 4 activities and will end with a validated laboratory technology.

CORE-PV

COmposite materials and multifunctional coatings with improved performance and REcyclability for integrated PV applications

Energy consumption sustainability goals require the development of alternative technologies and the use of increasingly recyclable materials to minimise environmental impact. CORE-PV (COmposite materials and multifunctional coatings with improved performance and REcyclability for integrated PV applications) aims to develop technologies for the generation of distributed clean energy, using highly recyclable materials through highly competitive manufacturing processes.

Solar photovoltaic (PV) will lead the spectrum of renewable energy in the short-medium future. So, the incorporation of PV elements in buildings to replace traditional construction materials, in the envelope of electric vehicles, or in urban furniture components, are examples where innovative solutions are necessary.

CORE-PV will develop innovative solutions in:

- -Raw materials development
- -Manufacturing processes
- -Durability, longer life cycle and enhanced performance of the developed products
- -Reciclability techniques

DeeMa

Design and Optimisation Open Innovation HUB for Composites Modeling and Design

Objectives: The project will develop a data-driven computational approach and open innovation platform for composite materials modelling and simulation. At the heart of DeeMa project are the concepts of i) integration of materials knowledge (ontologies), ii) automating routine design activities (interoperability), iii) integration of physical and data driven models (digital twin), iv) Design (inverse problems) and uncertainty and sensitivity analysis (Bayesian approach) and v) Develop a constitutive manifolds to accelerate material design.

Potential applications: The outcome of this project is expected to extend research scope in both mechanics and data sciences and demonstrate the prototype of a platform enabling integrated design of novel composite materials.

Impact and potential benefits: The tangible benefits of the DeeMa ecosystem and platform will be captured by the industry and especially Small and Medium-sized Enterprises (SMEs).

DePriSS

Development of “3D print-thermal spray” systems for applications with dynamic and impact loading

Additive technologies have potential to produce light and complex-shaped components. However, required service life and reliability under different load modes has to be ensured. Cyclic and dynamic loading can be considered critical. Components surface needs to be protected against wear and corrosion. For various reasons fatigue strength and service life may be reduced. Main objective is the development of 3D print-thermal spray systems resistant against wear and corrosion. Optimization of coatings composition and process parameters will be done. Methodologies for evaluating the response to cyclic and dynamic loads of 3D printed components, coatings themselves and their combinations will be developed and validated. Such combination enables to exploit advantages of 3D printing with benefits provided by thermal spraying. The results will have an impact on extension of both additive technologies into wider range of application, including power, aerospace, automotive, civil engineering etc.

EMMA

Exploring Multi-Method Analysis of composite structures and joints under consideration of uncertainties during engineering and processing

The main objective and innovation of EMMA project is the exploration of a multi-method approach for analysis of composite structures and joints under consideration of uncertainties during engineering and manufacturing. In particular, classical finite element simulation methods are accompanied by the new Peridynamics method for inherently capturing failure mechanisms without additional engineering assumptions. Constitutive material models are implemented to accurately represent the material behaviour, fatigue failure and crack propagation effects on composite structures and joints. This enables more reliable prediction and virtual testing of structures under consideration of tolerances and uncertainties, as demanded by certification authorities. Moreover, the implementation of affordable production quality assurance systems for composite structures will be established.

Glass3D

Shaping Glass in the 21st Century: Additive Manufacturing of Transparent Glass Objects

The fabrication of glass objects having complex shapes with advanced functionalities such as adaptors and connectors for optical circuit boards is not realized due to materials and technological limitations, and there is an unmet need for new fabrication processes for making functional glass objects. The most innovative and modern shaping technology of the 21st century is the additive manufacturing. The 3D printing of glassy objects, specifically for optical applications, is still very challenging. Thus, fundamental materials research and technological development will provide advances in 3D fabrication methods. The major goal in the project is to provide 3D printed glassy demonstrator objects with high optical transparency as well as reduced amount of bubbles and interfaces for potential future applications as optical components, e.g. light guide structures, miniaturized lenses and mirrors, and optical computing.

HybbiStent

Hybrid biodegradable coating for one-wire peripheral nitinol stent for prevention of restenosis and plaque formation

Peripheral arterial disease (PAD) is caused by atherosclerosis of major vessels supplying the lower extremities and lead to the limited walking ability and reduced quality of life. Self-expanding stents from nitinol revolutionized the treatment of PAD. In spite of significant progress of this technology in the last

years, complications, such as in-stent restenosis and re-occlusion rates, are still results of stent implantations. The proposed project HybbiStent aims to develop an unique double-layer coating technology for one-wire peripheral nitinol stent, aimed to minimize the risks of in-stent restenosis and plaque formation due to the use of chemically modified biomimetic lipophilic nanoparticles, carbon-coated iron nanoparticles and detonation nanodiamonds, imitating the structure of natural lipoproteins as anti-restenosis agents. The successful implementation of the project will lead to a competitive product in interventional cardiology with high public value and commercialization.

INSTEAD

Study of InNovative compoSite Thin films based on metallic nanowire nEtworks and functional oxides for application in smArt winDows

Functional materials are key components for industrial development. Smart windows create climate adaptive building shells and play a prevailing role for energy consumption reduction within buildings. There is a clear need to conceive and fabricate functional low-cost and abundant raw material based thin layers with the aim of integrating them in smart windows. INSTEAD proposes an interdisciplinary approach for modelling and fabricating innovative eco-friendly functional materials for efficient, low-cost and stable thermo- and electrochromic devices. The fabrication and optimization of both indium-free transparent electrodes (based on metallic nanowire nanocomposites) and active oxide layers will be thoroughly investigated. Innovative routes will be explored to assess new composites and/or hybrid materials. Specific attention will be devoted to their integration in thermo- and electrochromic devices with the goals of increasing stability and efficiency, and lowering cost.

LaSensA

2D regular nanostructures for lasing and sensing applications

The aim of this collaborative research project is to study the collective optical behaviour of self-assembled nanoparticle arrays and their internal photophysical processes, and to explore their feasibility for plasmon nanolasers and biosensors. The following objectives are planned to be solved: (1) to study how the pattern and symmetry of nanoparticle‘s (NPs) arrays impact the surface lattice resonance (SLR) and introduce methods to enable active tuning of the SLR wavelength; (2) to study the internal photophysical processes of SLRs by comparing NP in arrays versus NPs in solution; (3) to use the SLRs of these self-assembled NP arrays to create a surface plasmon nanolaser; (4) to use 2D plasmonic structures for biosensing applications; (5) to develop alternatives to classical lithographic techniques, employing controlled wrinkling in combination with soft lithography that can be up-scaled to macroscopic areas and is compatible with continuous roll-to-roll processing.

LITAPROP

Light-weight composite structures with tailored mechanical, electrical and thermal properties

Alongside their excellent specific mechanical properties, fibre-reinforced thermoplastics (FRT) bear the potential to reduce manufacturing costs due to their high volume production capability while also being well recyclable at a low energy level. The areas of application, however, are still limited concerning thermal

and electrical properties. The LITAPROP project addresses these limitations by developing novel nano and micro filler veils and strips (NMFVS) while also taking process chains and the development process itself into account. The NMFVS enable users to tailor the properties of a composite layup to their specific thermal and electrical needs without a negative effect on the mechanical properties. With the development of this technology and a suitable design methodology, FRT can be used in important mass-critical applications like bat-tery, controller, or drivetrain housings for electromobility.

LUBRICOAT

Simulation-aided design of solid lubricant coatings

The proposed project combines atomistic simulations with new deposition technologies to design a new class of superhard solid lubricant coatings based on molybdenum disulphide combined with carbon. We employ molecular dynamics to identify composition and structure with the optimum mechanical and tribological properties and use two novel methods to prepare such coatings at an industrial scale. Optimized coatings will be tested both in laboratories and in industry-driven field tests. The main goal is to harvest fundamental research to advance the coating technology from TRL 2 to TRL 6 by demonstrating the solid lubricant coating production on an industrial scale.

MIST

MultI-Scale Simulation Toolbox

SiO2 is one of the most used coating deposited by Physical Vapor Deposition for various applications. Magnetron sputtering is popular in industry but then only thin layers are possible. An alternative is Plasma-Enhanced Chemical Vapor Deposition (PECVD) process based on hollow cathode source (HC). Deposition is possible at high rate for many days of continuous operation. Unfortunately, coating composition, uniformity and quality vary strongly with not well mastered process parameters. The aim of this project is to build an off-line digital twin of a HC PECVD process with advanced physical and chemical numerical models to simulate plasma, coating growth and predict film properties. The simulation framework will be a general toolbox with numerous possible applications of PECVD in solar, window film, glass, textile, and packaging industries. Here, it will be validated by experimental data obtained by one of the industrial partner in an industrial size HC source.

MOFAC2CAP

Development of Novel MOF Aerogel Composites to CAPture CO2

What if we were able to utilize environmentally friendly multifunctional nanostructured porous materials with prominent unique characteristics to tackle the challenging reduction in CO2 emissions induced by industrial operations? MOFAC2CAP philosophy is routed on academic, technological and industrial diversity by collaboration of universities and industrial partner (oil and gas) from two countries. It aims at the development of highly efficient and innovative hierarchically porous composites to foster carbon capture technologies matching with end user’s needs. More than 90% CO2 capture rate, large CO2 uptake capacity and high CO2 selectivity of developed materials in a multicomponent gas at TRL4 serve as effective indicators for the reliable solution. This

promising novelty on the composite material development, contributing to mitigate the negative effects on the climate change, will be further broadened in other carbon-intensive sectors as cement, steel and fertilizer.

MOGLiS

MOF@rGO-based cathodes for Li-S Batteries

Publishable abstract Lithium-sulfur (Li-S) batteries are attractive next generation energy storage devices in sectors like transportation due to their higher theoretical capacity and energy density. The lack of high-performance cathodes that can overcome the decay in cell capacity with cycling hinders the current market realization of Li-S batteries. The MOGLiS project aims at fabricating high performance cathode materials using novel MOF@rGO architectures with MOF decorated graphene-based nanosheets at nanoscale engineering cathodes carefully from the crafted chemistry and architecture with superior electrical properties and efficient immobilization of sulfur. Such flexible Li-S cathodes will be designed and demonstrated at TRL 4 for a high initial capacity >1300 mAh.g-1 and a reversible capacity, after 20 cycles, superior to 1200 mAh.g-1, but also a high cyclability with demonstrations >100 cycles with a capacity loss of less than 0.010% per cycle, for a sulfur loading in the cathode superior to 75%.

NanoBainControl

Accelerated nanobainitic transformation in low-alloy steels processed by incremental forging.

New methods based on fuzzy logic, measurement techniques and model calculations for cost-effective parameterization of incremental forging operations, especially for innovative carbide free bainitic steels are being developed in this project. If material costs play the most important role in manufacturing of the forged component, the optimization of material consumption should be considered. Our know-how and technology can help to use cost efficient materials in a wider range. Integrated forging equipment with measuring system gives large flexibility in processing chain development and obtaining good quality products. The decisive factors for obtaining good quality products are: fatigue strength, wear and tear and strength of the manufactured components. These are the most important component features today. To benefit from the new material concept, the technology design must take into account the development of the material microstructure.

NiWRe-Alloys

Electroplating NiW and NiRe alloys as functional alternative coatings

Objectives:

The main objective is the development of new electrolytes for the electrochemical deposition of Nickel-Tungsten (NiW) and Nickel-Rhenium (NiRe) functional layers.

Potential applications:

The layers will be able to substitute hazardous Chromium (VI) electrolytes widely employed for corrosion and wear resistance.

The filling of polymer microstructures will enable the substitution of expensive gold as X-ray absorbing material in medical imaging and non-destructive testing.

Impact and benefits:

The introduction of NiW and NiRe as X-ray absorbing material will have a huge impact for the market introduction of a new medical imaging modality called dark-field imaging through which e.g. diseases related to the degradation of lung alveoli such as chronic obstructary pulmonary disease can be made detectable in an early stage through classic radiography. The substitution of chrome (VI) contributes significantly to environmental protection and better working condition for employee.

NovMat-AM

Novel metallic materials, feedstock and fabrication processes for high-performance additive manufactured goods

High Entropy Alloys (HEAs) can enable high-performance products through not only extraordinary levels of properties but also unique combinations of properties. However, the industrial application of HEAs faces considerable challenges. It is the objective of NovMat-AM to explore and design novel metallic materials and feedstock based on HEAs and to develop processes for the Additive Manufacturing (AM) of such materials for future applications in aerospace, power generation and tooling industry. The main impact of NovMat-AM will be to provide novel low cost and low density HEAs which exhibit high strength, corrosion and wear resistance and are suitable for the AM of parts in an industrial environment. Furthermore, the development of feedstock (filaments and granules) for the processing of advanced metals by emerging material extrusion methods and the development of hybrid DED to enable crack- and segregation-free manufacturing of complex alloyed materials are addressed.

PlasmaComp

Plasma-polymerized functional bio-based composite coatings

Functional coatings are traditionally made from low recyclable synthetic feedstock and wet chemistry approaches, potentially associated to longer processing times and higher material consumption. The PlasmaComp project addresses these aspects with the development of bio-based high-performance composite coatings reinforced with sustainable fillers using an atmospheric pressure plasma deposition method. The functional composite coatings will be deposited on cellulose-based materials in order to improve technological, mechanical and antimicrobial properties for applications in the packaging and sport goods industry. The interdisciplinary, transnational consortium of research and industry will enable the development of functional, eco-friendly composite coatings combined with flexible, material and energy-saving plasma techniques to deliver innovative products to the market with economic and ecological impact.

proTool

Oxide-resistant tungsten carbide high-temperature forming tools by innovative coatings and mechanical interface manipulation

The project “proTool" is focussed the development of solutions for an increased wear resistance of high-temperature-applications forming tools by creation of a competent and efficient European network of universities, institutes, and industrial partners. The developments aim for innovative surfaces, coatings and interfaces.

The process restrictions of forming technologies can be traced back to overloads of allowed forming tool strains. Therefore, the performance of the forming tools are determining the productive application of forming technologies. The technological limits, especially in warm and hot forming, are set by thermal tool strain and complex tribological conditions. Through the application of new carbide grades, innovative substrate pre- and post-treatment and the advanced development of coating technologies a performance increase of warm and hot forming tools is expected to be achieved.

RePoParts

Additive manufacturing Parts and Coatings using Recycled Powder from waste

The development of new materials for European and world industry is of paramount importance. However, it requires eco-friendly new production technologies to protect the natural environment, preserve critical natural resources, and to reduce CO2 emission. Classic methods of producing advanced engineering materials often involve high CO2 emission and degrade the natural environment due to the need for raw materials in the production process. The objective of the “RePoParts” project is to use metallic scraps containing highly valuable elements such as: Cr, Ni, Mo, V to produce powder for additive manufacturing (AM) technologies (i.e. LMD, SLM) and for coating deposition (i.e. HVOF). The powder obtained in the project will have a wide range of applications in High-Speed AM and thermal spray technologies. It will be used to produce new types of materials and new smooth and thin coatings for innovative components with a low carbon footprint.

SAFFIA

Sustainable and thermally Amplified Felts and Foams. Innovative Application of reactively extruded biobased nanocomposites

The European transport market calls for multi-functional parts having lightweight benefits based on sustainable raw materials. Insulating foams and felts have come to a limit in their thermal insulating performances developments. In addition, these parts are mainly based on polyurethanes which originate from crude oil and imply toxic isocyanates use.

To solve these issues, SAFFIA will develop enhanced thermal insulating parts with environmental and process health benefits. The proposed holistic approach will develop an in situ polymerized nanocomposites composed of biobased non-isocyanate polyurethanes and insulating low density silica-aerogel nanoparticles. Polymerizations and compatibilizations will be conducted in an extruder allowing operating conditions versatility and control over nanoparticle dispersion. The two industrial partners include an automotive producer which will ensure efficient developments from products specifications to TRL6 demonstrators.

SEBM-WC-Co

Additive Manufacturing of Hard Metals by SEBM

Additive manufacturing via powder bed fusion is commercially available, but the choice of high-performance materials is limited. Using a novel approach to powder metallurgy and electron beam melting WC-Co parts will be produced. The objective is to develop a viable AM route for WC-Co cemented carbides. The AM process chosen is PBF by electron beam. Critical objectives for success in this project, include: Feedstock preparation exhibiting good flow properties, spheroidised for even bed filling; the SEBM parameters must be optimised; and finally the components will be field tested and performance compared to conventionally manufactured parts. Bar peeling inserts will be field tested. However, other industry sectors such as metal working have niche tooling requirements that are ideally suited to AM manufacture. The benefits will be increased knowledge and potential industrialisation of the process. Making niche market items that could not otherwise be manufactured or small batch items.

ShapeAM

On-the-fly laser beam shaping for Laser Metal Deposition of crack-sensitive Al-Ti alloys

The objective is to use a novel CBC OPA fiber laser for AM. The CBC OPA fiber will create unlimited beam shapes and scanning patterns.This fast laser beam shaping tool enables unprecedented modifiable intensity distributions for enhanced control of melt pool shape, size and dynamics that will improve processing: reduction of cracking, a distortion-low and near net shape build-up process, reduced part surface roughness and the capability to process critical and new materials. Potential applications are numerous and in all branches (medicine, energy but especially aerospace and space). A model will be developed on how fast laser beam shaping can be translated into manufacturing strategies.CBC OPA fiber laser will be used in an experimental approach to demonstrate how beam shaping is able to improve the AM process.LMD with testing on critical materials like crack-sensitive Al and Ti alloys is the focus. A novel printer will be designed and constructed. As a result, ShapeAM will reach TRL4

SLiCE

Development of novel single Li-ion conducting polymer electrolytes for flexible and safe solid-state batteries

Solid-state Li-ion batteries (SSLIB) are a key development for energy storage as a safer alternative to current solution containing flammable liquid electrolytes. However, the performance of commercial SSLiB in terms of ion-mobility, capacity and fast charge remains inferior to their liquid counterpart. The objective of the SLiCE project is to develop novel single-ion polymer electrolytes (SICP) and therefrom solid polymer electrolytes (SPE), with improved conductivity and cycling performance as part of NMC-Li/Cu solid state battery. SLiCE project finds its application in an undeniably growing market of high-capacity rechargeable batteries that target electric vehicles (EV), energy grid storage, IoT, and more. Offering novel SPE materials with improved ion-conductivity, stability, and safety, SLiCE project has a direct impact on SSLiB technology and an active role in reaching EU’s goals of reducing greenhouse gas emissions by empowering vehicles with alternative energy.

SLIM-FIT

Stable and safe Lithium-Metal / Sulfur Batteries enabled by carbon felt current collectors and advanced interface technologies

Rationale / Needs to be addressed
A rapid market growth for battery electric vehicles (BEV) is observed and new market opportunities are expected to emerge, such as emission-free aviation requiring batteries with improved and tailored performance criteria.

- Objectives
  Main objective of “SLIM-FIT” is to establish an advanced battery cell design based on innovative, interpenetrating electrode and separator coatings aiming for a new generation of stable and safe Lithium-Sulfur batteries.
- Potential applications
  Improved batteries for vehicle and drone applications are targeted and will be supported by prototype demonstration.
- Impact and potential benefits
  The electrification of the mobility sector and especially, the development of improved batteries is an emerging market opportunity and companies along the value chain can profit from this growth sector. “SLIM-FIT” is aiming bring innovations to this market und thus, to contribute to a sustainable future and economic growth.

SmartEnergy

Piezoelectric Energy Source for Smart Factory Applications

SmartEnergy aims to develop an integrated, miniaturized, highly energy efficient, maintenance-free and environmentally-friendly energy source, with extensive scalability and reconfigurability. The system integrates a MEMS piezoelectric energy harvester, a rectifier circuit and a supercapacitor, and shows a great promise to replace conventional energy sources and significantly reduce the environmental impact.
The proposal covers a new technology based on advanced multifunctional materials, including highly efficient piezoelectric materials and carbon nanotubes, with optimized nanostructured metal oxides and gel electrolytes.
The project will start from TRL 3 and will reach TRL 5. The development is largely industry-driven, with Renault as the end-user that is looking to upgrade factory processes monitoring through low power autonomous sensor nodes. Thus, SmartEnergy has a great potential to drive down cost, while making smart factory and IoT applications greener and more robust.

SmartHouB

Smart lightweight functionalized materials for Housing of Batteries

In SmartHouB a novel, functional, smart battery packaging technology is developed combining printed electronics with lightweight structural composite and metal layers. Especially, temperature sensors are crucial for battery safety and energy management. Carbonaceous polymer nanocomposites based on CNTs, doped CNTs, graphene, and metal nanoparticles will achieve sensors with high temperature sensitivity as well as interconnects with a significantly low

resistivity. The novel laminate system will offer several advantages, such as a high strength-to-weight ratio, high temperature resistance and mechanical strength. In addition, friction stir welding processes in combination with adhesive bonding to join the hybrid laminates will allow the use in many applications such as electromobility. The overall performance of the battery housing will be investigated according to international standards for batteries by developing a representative model on a laboratory basis and validating it at TRL 4

SMICE-Li

Stabilising Conversion Anodes with Solid Molecular Ionic Composite Electolytes for Solid State Lithium Ion Batteries

Solid State Batteries (SSBs) represent the most promising "next-gen" chemistry for Li-based batteries, as they combine the substantially increased energy density (>450Wh/kg) and improved safety that is needed to accelerate a societal shift from fossil fuels. Their development is currently stalled however, by challenges related to electrolyte performance at lower temperatures, and by problems controlling the efficient deposition and stripping of metallic lithium anodes. The SMICE-Li project proposes a new and entirely novel approach to address these problems, by combining high capacity conversion-type anode materials (CAMs) with a new class of solid state Li-ion electrolyte: A Solid Molecular Ionic Composite Electrolyte (SMICE). SMICE-Li will combine predictive modelling with fundamental interphase studies to tailor and match materials for best performance, with the objective of demonstrating the potential of an entirely new class of SSB that addresses the problems limiting current SSBs

SWIPE

Spectroscopy of Spin Waves In Perovskite Excited states

Today’s best spin-based computing devices are still plagued by large power consumption because charge currents are needed to modify magnetic states. To fully exploit spintronics, we need to process, transport and store information without using charge currents. The SWIPE project will pioneer a new route using spin waves (magnons) to carry signals over long distances. We will focus on antiferromagnetic (AFM) spin waves, which are fast and impervious to perturbations, but harder to control. Our key proposal is to use lattice vibrations (phonons) to control AFM magnons: Acoustic phonons can generate and propagate signals. Optical waves can couple to electronic and magnetic excitations, and modify the magnon properties. The key advantage of spin waves is their interface with nonvolatile magnetic states, which enables ultralow power information and communication technology. A second important front is sensors and actuators, made exquisitely sensitive and efficient with magnonic devices.

TAGGED

Research, Development and characterization of a TunAble Graphene liGht Emitting hybrid MOEMS Device

High performance solid-sate light sources are critical components in many MOEMS and have been the subject of much research in recent years. With the advent of graphene and thanks to its superior physical properties, a new field of research has been opened up for exploiting graphene properties for various applications. We aim to employ light emission properties of graphene when it is electrically biased, coupled with an electrostatically actuated substrate to

develop a light source with tunable wavelength and intensity. A graphene layer is suspended over a substrate that can be positioned, allowing fine adjustment of its distance to the graphene layer, hence tuning the reflected light and its interferences with respect to wavelength and intensity. Such precisely engineered tunable light sources can provide a broad optical bandwidth and advance the spectral resolution in a variety of domains including spectroscopic measurements to investigate wavelength-dependent properties of materials.

ULTCC6G_EPac

Ultra-Low Temperature Co-fired Ceramics for 6th Generation Electronic Packaging

Information and communication technologies for 5G and 6G are today one of the most vital areas to address demand for energy efficiency, sustainability, environmental friendliness, low manufacturing cost, and circular economy. There is a great need for new or upgraded materials with specific properties and relevant technologies. The ULTCC6G-EPac will design, implement, validate, and demonstrate ultra-low temperature co-fired ceramics (ULTCC) fabricated at 400-700 °C, destined for multilayer high frequency (GHz-THz) devices. It implements new functional materials, facile ceramic tapes, and upgraded ULTCC packages (RoHS and REACH compliant) useful for 6th generation devices in telecommunication K band and D band. Structural, microwave and mmWave dielectric, thermal and mechanical materials properties will be studied. Consortium will develop new materials (IKTS,DE), characterize (L-IMiF, QWED,PL), design, prototype and test the product in industrial environment (CEA Leti & INOVEOS, FR).

WReMo

Powder feedstock production and 3D printing of refractory metals and alloys for aerospace applications

Additive manufacturing (AM) is currently the fastest developing production method. One of the AM’s problems is limited availability of feedstock powders, especially visible in the case of refractory metals. Refractory metal powder feedstock for AM is produced by plasma spheroidization or plasma atomization methods. In the scope of the project, W-Re and Mo-Re alloys will be developed, using both of those methods. Generic LPBF processing parameters for new feedstock material will be developed and demonstrative elements –rocket engine parts– will be manufactured. The new powders will be also developed with the use of material recovered from waste/scrap, which is especially important in case of materials regarded as Critical Raw Materials (CRM).The results of the project will form a basis of introduction of new products to the market and the project will help in gaining new knowledge on W-Re and Mo-Re alloys, as well as their behaviour during processing in plasma flame and LPBF processes