M-ERA.NET Call 2024:
List of projects recommended for funding

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Sustainable advanced materials for energy	4SIBAT	Sustainable advanced materials for Solid-State Sodium-Ion BATteries: an efficient, safe and eco-friendly energy storage system	5	**AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (ES)** UNIVERSITA DELLA CALABRIA (IT) CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (FR) NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE FOR CRYOGENICS AND ISOTOPIC TECHNOLOGIES ICSI RM VALCEA (RO) CIS ROBOTICS SMART SOLUTIONS SOCIEDAD LIMITADA (ES)	AEI (Spain) CALABRIA (Italy) UEFISCDI (Romania) SEKUENS (Spain)
Sustainable advanced materials for energy	BAS4WIND	Basalt Fiber Composites for Sustainable Wind Energy	6	**POLITECHNIKA WARSZAWSKA (PL)** DANMARKS TEKNISKE UNIVERSITET (DK) LATVIJAS UNIVERSITATE (LV) IZMIR KATIP CELEBI UNIVERSITESI (TR) TMBK PARTNERS SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (PL) FIBERJOINTS (DK)	NCBR (Poland) IFD (Denmark) LZP (Latvia) TUBITAK (Turkey)
Sustainable advanced materials for energy	GENSIB	Genetic Approach to Sodium-Ion batteries	6	**OULUN YLIOPISTO (FI)** LAPPEENRANNAN-LAHDEN TEKNILLINEN YLIOPISTO LUT (FI) UNIVERZITA KARLOVA (CZ) UNIVERSITE DE FRIBOURG (CH) **THE MATHWORKS GMBH (DE)* *CABB TECHNIKERSCHULE (CH)*	AKA (Finland) TACR (Czech Republic) SFOE (Switzerland)
Sustainable advanced materials for energy	GRIPHUS	Green Innovative Photocatalytic systems for CO2 Utilization to produce e- fuelS	4	**CONSIGLIO NAZIONALE DELLE RICERCHE (IT)** TECHFEM S.P.A. (IT) INSTITUT JOZEF STEFAN (SI) LATVIJAS UNIVERSITATES CIETVIELU FIZIKAS INSTITUTS (LV)	CALABRIA (Italy) MVZI (Slovenia) LZP (Latvia)

[1] Participants requesting no funding are marked with an asterisk and printed *in italc type*.; the coordinator is printed in **bold type**.

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Sustainable advanced materials for energy	HYDRAGON	From Light to Energy: Synergetic Multifunctional Materials Driving Photoelectrochemical Hydrogen Generation	6	**FUNDACION IMDEA ENERGIA (ES)** KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY (KR) JEONBUK NATIONAL UNIVERISTY (KR) SAMWHAN (KR) ISTANBUL TEKNIK UNIVERSITESI (TR) UNIVERZITA KARLOVA (CZ)	AEI (Spain) KIAT (Korea, Republic of) TUBITAK (Turkey) TACR (Czech Republic)
Sustainable advanced materials for energy	HYPOLFAIL	Hydrogen-Induced Damage to Polymers at High Pressure: Understanding Interaction and Failure Mechanisms	7	**SCIOFLEX HYDROGEN GMBH (AT)** GLOBAL DESIGN TECHNOLOGY (BE) SEAL MAKER PRODUKTIONS- UND VERTRIEBS GMBH (AT) PANNON EGYETEM - UNIVERSITY OF PANNONIA (HU) UNIVERSITE DE LIEGE (BE) UNIVERSITAT LINZ (AT) CONSORZIO MATELIOS - DISTRETTO TECNOLOGICO SUI MATERIALI AVANZATI PER LE ENERGIE RINNOVABILI - IN BREVE DISTRETTO MATELIOS (IT)	FFG-Mobility (Austria) SPW (Belgium) NKFIH (Hungary) CALABRIA (Italy)
Sustainable advanced materials for energy	OCULUS	Operando Techniques for Conversion reaction engineering in high-energy Lithium SULfUr Solid state batteries	5	**FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (DE)** TECHNISCHE UNIVERSITAET DRESDEN (DE) SIXONIA TECH GMBH (DE) PARIS-LODRON-UNIVERSITAT SALZBURG (AT) KEMIJSKI INSTITUT (SI)	SMWK (Germany) FFG-Mobility (Austria) MVZI (Slovenia)
Sustainable advanced materials for energy	PARACELSis	Parallel-connected calchopyrite-silicon based tandem cell	4	**UNIVERSIDAD POLITECNICA DE MADRID (ES)** CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (FR) ODTU GUNES ENERJISI UYGULAMA VE ARA STIRMA MERKEZI (TR) MONDRAGON ASSEMBLY SOCIEDAD COOPERATIVA (ES) UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU (ES)	AEI (Spain) ANR (France) TUBITAK (Turkey) ES-EJ-GV/Innobasque (Spain)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Sustainable advanced materials for energy	PECZIB	Photo-electrochemical Hydrogen Generation Integrated with Photo-chargeable Zinc Ion Battery	4	UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU (PL) **TOBB EKONOMI VE TEKNOLOJI UNIVERSITESI (TR)** INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE PENTRU TEHNOLOGII IZOTOPICE SI MOLECULARE-INCDTIM CLUJ-NAPOCA (RO) SABANCI UNIVERSITESI (TR)	NCN (Poland) TUBITAK (Turkey) UEFISCDI (Romania)
Sustainable advanced materials for energy	RESH	Renewable Energy via Sustainable Hydrogen	3	**INSTITUT JOZEF STEFAN (SI)** UNIVERSITE DE LIEGE (BE) UNIWERSYTET JAGIELLONSKI (PL)	MVZI (SI) FNRS (Belgium) NCN (Poland)
Innovative surfaces, coatings and interfaces	CERMIC	Innovation in complex structures combining 3D Microvilli-based materials and active coating and interfaces to disrupt high-capacity filtration systems	6	**B4C APS (DK)** DANMARKS TEKNISKE UNIVERSITET (DK) UNIVERSIDAD AUTONOMA DE MADRID (ES) UNIVERSIDAD DE EXTREMADURA (ES) BIOSNAR CONSULTING SLU (ES) UNIVERZA V MARIBORU (SI)	IFD (Denmark) AEI (Spain) ES-EJ-GV/Innobasque (Spain) MVZI (Slovenia)
Innovative surfaces, coatings and interfaces	ClearSensTech	Advancing Transparent, Tunable Piezoresistive Coatings for Next-Generation Smart Buildings	7	**INSTITUTUL NATIONAL DE CERCETARE DEZVOLTARE PENTRU FIZICA LASERILOR PLASMEI SI RADIATIEI (RO)** FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (DE) INSTITUTUL NATIONAL DE CERCETAREDEZVOLTARE PENTRU MICROTEHNOLOGIE (RO) ATTOPHOTONICS BIOSCIENCES GMBH (AT) TECHNISCHE UNIVERSITAET DRESDEN (DE) SC SAINT-GOBAIN GLASS ROMANIA SRL (RO) C-MARX GMBH (DE)	UEFISCDI (Romania) SMWK (Germany) FFG-KLWPT (Austria)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Innovative surfaces, coatings and interfaces	HerAqua	Innovative nano-carbon based electrochemical monitoring of female hormones	4	**INSTYTUT MASZYN PRZEPLYWOWYCH IM ROBERTA SZEWALSKIEGO POLSKIEJ AKADEMII NAUK - IMP PAN (PL)** UNIVERSIDADE DE SAO PAULO (BR) INSTITUTUL NATIONAL DE CERCETARE DEZVOLTARE PENTRU FIZICA MATERIALELOR (RO) MICRUX FLUIDIC SL (ES)	NCN (Poland) FAPESP (Brazil) UEFISCDI (Romania) SEKUENS (Spain)
Innovative surfaces, coatings and interfaces	InnoCoat4Plasma	Innovative, bio-based plasma coatings on micro- to nano-structured surfaces for microfluidic and riblet applications	5	**KOMPETENZZENTRUM HOLZ GMBH (AT)** LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY (LU) INMOLD AS (DK) BIONIC SURFACE TECHNOLOGIES GMBH (AT) NASTASIA OKULOVA (DK)	FFG-KLWPT (Austria) FNR (Luxembourg) IFD (Denmark)
Innovative surfaces, coatings and interfaces	Photohmic	Oxide-based photonic crystal ohmic contacts for efficient GaN-based PCSEL diodes	6	**SIEC BADAWCZA LUKASIEWICZ - INSTYTUT MIKROELEKTRONIKI I FOTONIKI (PL)** **SLOVENSKA TECHNICKA UNIVERZITA V BRATISLAVE (SK)* HUN-REN ENERGIATUDOMANYI KUTATOKOZPONT (HU) INSTITUTE OF ELECTRICAL ENGINEERING, SLOVAK ACADEMY OF SCIENCES (SK) INSTYTUT WYSOKICH CISNIEN POLSKIEJ AKADEMII NAUK (PL) TOPGAN (PL)	NCBR (Poland) NKFIH (Hungary) SAS (Slovakia)
Innovative surfaces, coatings and interfaces	SURPHACE	SUrface enhanced Raman spectroscopy for PatHogen sensing and Anti-pathogenic Coating devElopment	5	**PHORNANO HOLDING GMBH (AT)** PARIS-LODRON-UNIVERSITAT SALZBURG (AT) AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (ES) QSAR LAB SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (PL) NATIONAL TAIWAN UNIVERSITY (TW)	FFG-KLWPT (Austria) AEI (Spain) NCBR (Poland) NSTC (Taiwan)
High performance composites	EnFiCab	Environmentally Responsible and Low Fire-hazard Polymer Composites for the Cable Insulations	3	**ZAPADOCESKA UNIVERZITA V PLZNI (CZ)** USTAV POLYMEROV SLOVENSKEJ AKADEMIEVIED VEREJNA VYSKUMNA INSTITUCIA (SK) ELEKTROINSTITUT MILAN VIDMAR (SI)	TACR (Czech Republic) SAS (Slovakia) MVZI (Slovenia)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Functional materials	BIONAFE	Bio-derived nanocarbon-based functional materials for the next generation electroceutical devices	3	**POLITECHNIKA SLASKA (PL)** CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (FR) KAZLICESME DERI URUNLERI AR-GE SAN. VE TIC. LTD. STI. (TR)	NCN (Poland) ANR (France) TUBITAK (Turkey)
Functional materials	deSalSea	Novel Sustainable Forward-Osmosis Seawater Desalination Process	4	**UNIVERSIDAD DEL PAIS VASCO/ EUSKAL HERRIKO UNIBERTSITATEA (ES)** FUNDACION DONOSTIA INTERNATIONAL PHYSICS CENTER (ES) CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (FR) CESKA ZEMEDELSKA UNIVERZITA V PRAZE (CZ)	AEI (Spain) ANR (France) TACR (Czech Republic)
Functional materials	PERFORMANCE	Optical sensors for detection of small organic molecules	5	**UNIVERSIDAD DE VIGO (ES)** UNIVERSITE DE STRASBOURG (FR) UNIVERSITAT WIEN (AT) METROHM DROPSENS SL (ES) EIBENSTEINER FRIEDRICH (AT)	AEI (Spain) ANR (France) FFG-KLWPT (Austria) SEKUENS (Spain)
Functional materials	PhotoPrint	Photo-Atomic Layer Printing	5	**AALTO KORKEAKOULUSAATIO SR (FI)** INSTITUTE OF ELECTRICAL ENGINEERING, SLOVAK ACADEMY OF SCIENCES (SK) ATLANT 3D NANOSYSTEMS APS (DK) **UNIVERSITEIT GENT (BE)* **LUNDS UNIVERSITET (SE)*	AKA (Finland) SAS (Slovakia) IFD (Denmark)
Functional materials	PRE-ActiVer	Prefabricated, lightweight, energy-active wall panel for zero-emission buildings	4	**POLITECHNIKA LODZKA (PL)** STO SP. Z O.O. (PL) TALLINNA TEHNIKAÜLIKOOL (EE) UNIVERSITATEA TEHNICA DE CONSTRUCTII BUCURESTI (RO)	NCBR (Poland) ETAG (Estonia) UEFISCDI (Romania)
Functional materials	REGENESIS	REvolutionising bone and cartilaGE reconstruction through Novel cell-instructive biomaterial and peptide-Enhanced Stem cell Immobilization Strategy	7	**POLITECHNIKA WROCLAWSKA (PL)** UNIWERSYTET LODZKI (PL) UNIWERSYTET GDANSKI (PL) POLBIONICA SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA (PL) INSTITUT JOZEF STEFAN (SI) UNIVERSITE LAVAL (CA) **BIOMOMENTUM INC. (CA)*	NCBR (Poland) MVZI (Slovenia) PRIMA (Canada)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Functional materials	SeSeoS	Revealing of Se-based semiconductors for electro-optical gas sensors	3	**KAUNO TECHNOLOGIJOS UNIVERSITETAS (LT)** LATVIJAS ORGANISKAS SINTEZES INSTITUTS (LV) NATIONAL YANG MING CHIAO TUNG UNIVERSITY (TW)	LMT (Lithuania) LZP (Latvia) NSTC (Taiwan)
Functional materials	SMARTPIEZO	Smart Piezoelectric Bio-based Osteochondral Construct as a Model for Drug Testing and Implant for Joint Defects	4	VALSTYBINIS MOKSLINIU TYRIMU INSTITUTAS INOVATYVIOS MEDICINOS CENTRAS (LT) SCINNOVATION S.R.O. (CZ) **INSTYTUT PODSTAWOWYCH PROBLEMOW TECHNIKI POLSKIEJ AKADEMII NAUK (PL)** LATVIJAS ORGANISKAS SINTEZES INSTITUTS (LV)	LMT (Lithuania) TACR (Czech Republic) NCN (Poland) LZP (Latvia)
Materials addressing environmental challenges	AH-Nano-Cat	Advanced Hybrid Nanomaterials for Efficient Photo(electro)catalytic Water Purification and Hydrogen Production	3	**POLITECHNIKA WARSZAWSKA (PL)** VSB - TECHNICAL UNIVERSITY OF OSTRAVA (CZ) NSTC (TW)	NCBR (Poland) TACR (Czech Republic) NSTC (Taiwan)
Materials addressing environmental challenges	BioCAN	Development of bio-based polymers with covalently adaptable networks for recyclable natural fibre reinforced composite production	7	**LATVIJAS VALSTS KOKSNES KIMIJAS INSTITUTS (LV)** USTAV MAKROMOLEKULARNI CHEMIE AV CRVVI (CZ) UNIVERZITA KARLOVA (CZ) POLITECHNIKA WARSZAWSKA (PL) NOMA RESINS SP(ZOO) (PL) TECHNISCHE UNIVERSITAET DRESDEN (DE) LEICHTBAU - ZENTRUM SACHSEN GMBH (DE)	LZP (Latvia) TACR (Czech Rebpblic) NCBR (Poland) SMWK (Germany)
Materials addressing environmental challenges	Hemp4Performance	Hemp Bast Composites for High-Performance Applications in Circular Economy	8	**KOMPETENZZENTRUM HOLZ GMBH (AT)** UNIVERSITAET INNSBRUCK (AT) DIPL. ING. (FH) ALOIS BAUER, MATTRO (AT) WEIZ FORSCHUNGS & ENTWICKLUNGS GGMBH (AT) SAECHSISCHES TEXTILFORSCHUNGSINSTITUT E .V. (DE) HOLZBAU MEYER INH. DIPL.-ING.(FH) (DE) CROTTENDORFER TISCHLERHANDWERK GMBH (DE) HYLER BV (BE)	FFG-KLWPT (Austria) SMWK (Germany) VLAIO (Belgium)

Call topic	Acronym	Full Title	No. of Partner	Participants[1]	Funding organisations
Materials addressing environmental challenges	REECovery	Circular economy through a sustainable recovery technology of critical resources (REEs) from selected waste materials	5	**INSTYTUT GOSPODARKI SUROWCAMI MINERALNYMI I ENERGIA PAN (PL)** UNIWERSYTET MARII CURIE-SKLODOWSKIEJ (PL) VSB - TECHNICAL UNIVERSITY OF OSTRAVA (CZ) TURKISH ENERGY, NUCLEAR AND MINERAL RESEARCH AGENCY, RARE EARTH ELEMENTS RESEARCH INSTITUTE (TR) GEMINUS SP. Z O.O. (PL)	NCBR (Poland) TACR (Czech Republic) TUBITAK (Turkey)
Next generation materials for advanced electronics	Bio-Electro	Biodegradable electrodes as a platform for sustainable on-skin electrophysiology	8	**UNIVERSITAT DE GIRONA (ES)** CONSORCIO CENTRO DE INVESTIGACION BIOMEDICA EN RED M.P. (ES) RHP TECHNOLOGY GMBH (AT) MEDIZINISCHE UNIVERSITAET WIEN (AT) ABO AKADEMI (FI) **UPM-KYMMENE OYJ (FI)* **CH-BIOFORCE OY (FI)* INSTITUT NATIONAL DE RECHERCHE POUR L'AGRICULTURE, L'ALIMENTATION ET L'ENVIRONNEMENT (FR)	AEI (Spain) FFG-KLWPT (Austria) BF (Finland) ANR (France)
Next generation materials for advanced electronics	GREEN-MEM	Green materials for sustainable magneto-electronic memories	4	**FUNDACION IMDEA NANOCIENCIA (ES)** CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (FR) UNIVERSIDAD AUTONOMA DE MADRID (ES) UNIWERSYTET JAGIELLONSKI (PL)	AEI (Spain) ANR (France) NCN (Poland)

Publishable abstract of the projects:

4SIBAT

Sustainable advanced materials for Solid-State Sodium-Ion BATteries: an efficient, safe and eco-friendly energy storage system

Solid-state sodium-ion batteries (SSSIBs) are emerging as the most efficient near-term solution for energy storage that avoids the use of critical raw materials. However, there is still a need to develop materials that can be used in the electrodes and electrolyte to meet the performance requirements in terms of energy density and stability. 4SIBAT project pursued the design and production, through efficient and scalable processes, of (i) sustainable carbon materials from green monomers and (ii) optimized solid-state electrolytes based on hybrid conductive gel-polymer and single ion membranes. By combining these innovative and sustainable components it is intended to have, at the end of the project, a prototype of Sustainable-SSSIB (4SIBAT) with an optimized architecture able to competitively meet the demands of a robot in real operating conditions. With the 4SIBAT project we contribute to the EU's ambition to become a world leader in renewable energy and its secure supply.

AH-Nano-Cat

Advanced Hybrid Nanomaterials for Efficient Photo(electro)catalytic Water Purification and Hydrogen Production

Since water is one of the most important resources, it is crucial to keep it free from chemicals and pathogens to increase clean water accessibility. Simultaneously, water is a source of green hydrogen, which may replace fossil fuels, helping to keep the environment clean. The main objective of the project is the preparation of novel hybrid materials based on g-C3N4 with the addition of carbon nanomaterials and transition metal oxides (e.g. TiO2, Fe2O3) or sulfides (e.g. MoS2) that can be used for photo- and photoelectrocatalytic water purification and hydrogen production. The project results, i.e., g-C3N4-based efficient photo- and photoelectrocatalysts, will be used for water purification to remove organic dyes and bacteria, and in green hydrogen production via solar-driven water splitting. The catalysts will facilitate water reuse and increase the accessibility of both clean water and renewable energy, which are critical factors for human health and environmental sustainability.

BAS4WIND

Basalt Fiber Composites for Sustainable Wind Energy

The glass/carbon composites used in constructing wind turbine blades do not meet the European Green Deal policy requirements. With the short lifespan of blades and the lack of cost-effective and scalable recycling methods, 43 million tons of blade waste are generated annually. To boost the wind energy sector

towards more sustainable and recyclable materials, the project BAS4WIND overcomes these challenges by developing alternative composites from sustainable components such as natural basalt fibers, bio-epoxy resin, bio-additives, and thermoplastic bio-nonwovens. It ensures the prolonged composites' durability needed to build the specific parts of the blades (spar caps, skins, flange, girders) and to apply them in the construction or automotive sector. The project results' positive economic and environmental impact will be reflected by cheaper and cleaner energy production, lower carbon dioxide emission, and higher recyclability rate than traditional petroleum-based composites.

BioCAN

Development of bio-based polymers with covalently adaptable networks for recyclable natural fibre reinforced composite production

Fiber-reinforced polymer composites are crucial for light weight applications and are used across numerous industries like automotive and transportation, marine, ballistic and aerospace. However, an unsolved problem of recyclability exists for structural applications where thermoset resins are used. The overall objective of the BioCAN project is to demonstrate an integrated process chain that includes the efficient production of new polymeric materials, namely vitrimers, and their processing into natural fiber-reinforced polymer composites that are recyclable. Potential applications include the automotive and transportation industry. Within the project, the developed demonstrator will be for the backrest of a seat shell structure. The proposed technology would offer a path for bio-based, thermally recyclable thermoset polymer materials for the automotive and transportation industry.

Bio-Electro

Biodegradable electrodes as a platform for sustainable on-skin electrophysiology

Non-invasive recording of the electrical activity of different body parts is a fundamental technology in clinical diagnostics. This technology makes uses electrodes in contact with skin. Current electrodes show drawbacks associated with materials and technology, i.e. skin irritation, low signal quality, high electrode-skin impedance, plus big amounts of e-waste. The electrode market is expanding, resulting in thousands of tons of annual electronic waste. The Bio-Electro project aims to develop biodegradable electrodes for sustainable electrocardiogram (ECG) recordings. By utilizing nanocelluloses and biodegradable conductive inks, the Bio-electrodes will be flexible, conformable, wearable, breathable, biocompatible and fully biodegradable. Reduction of electronic waste with great benefits to the environment, society, and clinical users are expected. Monitoring of electrical activity from the eye (EOG), brain (EEG) or muscles (EMG) are other possible applications.

BIONAFE

Bio-derived nanocarbon-based functional materials for the next generation electroceutical devices

Bioelectronics, is an emerging technology in which real-time monitoring of human body is combined with its electrical stimulation. However, conventionally used bioelectronic materials induce a foreign body reaction resulting from the chemical, biological and mechanical mismatch between an implantable material and a living tissue, limiting accurate and chronic monitoring of electrophysiological signals. BIONAFE project aims to provide a bio-derived nanocarbon-based alternative to conventional devices, by developing a non-metallic, flexible material from carbon nanotube self-supporting films modified with a biologically active conducting hydrogel layer. Due to their porous nature and the presence of bioactive molecules/macromolecules, the material will be partially penetrated by cells, increasing the tissue/electrode integrity and facilitating a charge transfer process. These material will be used for the next generation bioelectronic devices, making the electro-therapies more efficient.

CERMIC

Innovation in complex structures combining 3D Microvilli-based materials and active coating and interfaces to disrupt high-capacity filtration systems

CERMIC project addresses the critical issue of global freshwater scarcity, as over 1.1 billion people lack access to safe drinking water, resulting in over 2 million annual deaths due to waterborne diseases. Ceramic membranes are promising for water treatment due to their stability and long lifespan, but they are currently limited to micro- and ultrafiltration, lacking precise separation capabilities. CERMIC aims to overcome these limitations by developing innovative ceramic membranes with superior filtration, modularity, and compactness, using advanced additive manufacturing techniques to create unique microvilli geometries. CERMIC will be applied in tap water filtration, wastewater treatment, water reuse, desalination, and environmental remediation. By achieving a significantly higher area-to-volume ratio, CERMIC will increase filtration capacity while minimizing operational costs - advancing water reuse and contaminant removal, supporting a sustainable circular economy.

ClearSensTech

Advancing Transparent, Tunable Piezoresistive Coatings for Next-Generation Smart Buildings

As urban populations grow, the demand for sustainable, energy-efficient glass with integrated sensing for failure prediction becomes increasingly critical. The ClearSensTech project addresses this gap by developing transparent piezoresistive coatings with tunable sensitivity for real-time stress and strain monitoring. These coatings combine advanced sensing with ecofriendly, recyclable materials, achieving TRL 4 by the project's end. Targeting architectural and civil engineering sectors, applications include smart windows, transparent curtain walls, and sensor networks for urban infrastructure, enhancing safety, structural monitoring, and energy efficiency. ClearSensTech will transform smart building technologies by boosting urban safety, cutting maintenance costs, and promoting sustainability. Its ecofriendly innovations align with circular economy goals, supporting EU sustainable construction directives.

deSalSea

Novel Sustainable Forward-Osmosis Seawater Desalination Process

The deSalSea project addresses urgent global needs for sustainable freshwater, focusing on advancing forward osmosis (FO) desalination to overcome energy inefficiencies in conventional methods. Key objectives include: developing novel polyzwitterionic draw solutions from sustainable resources, enhancing osmotic pressure, reducing viscosity, and enabling low-energy regeneration. The project also aims to design biomimetic membranes with Artificial Water Channels, targeting a threefold increase in desalination efficiency and 99.5-99.9% salt rejection. By raising the TRLs of DS to 3 and membranes to 6 and integrating them into a lab-scale FO device (TRL 4), the project seeks to demonstrate improved FO performance. The evaluation of energetic, economic and environmental impact will align with SDG 6. deSalSea aims to reduce carbon footprint, enhance sustainability, and ensure clean water access through biobased, recyclable materials and circularity.

EnFiCab

Environmentally Responsible and Low Fire-hazard Polymer Composites for the Cable Insulations

Low Fire Hazard Cables (LFHC) currently use pure polyethylene (PE) to insulate the core of the cable to achieve the best possible electrical insulation properties. However, pure PE has an unsuitable thermal burning profile, which can lead to failure of the LFHC under fire conditions. To develop a PE-based polymer composite containing a multi-component halogen-free flame-retardant system of natural origin consisting of metal hydroxides and clays to enhance LFHC core insulation. LFHC for fire safety elements (emergency lighting, fire extinguishing equipment) in places with a high concentration of people (tunnels, high-rise buildings, airports). Cables for electromobility and photovoltaic systems. New market opportunities for cable manufacturers lead to potential industry growth and job creation and promote effective cooperation between international research organisations and teams.

GENSIB

Genetic Approach to Sodium-Ion batteries

A sustainable energy future requires efficient generation, storage, and delivery systems. While lithium-ion batteries dominate, they rely on scarce, costly materials like lithium and cobalt, raising environmental and ethical concerns. Sodium-ion batteries (SIBs) offer a sustainable alternative using abundant materials like sodium, iron, and manganese. The GENSIB project advances SIB technology by addressing cathode stability, introducing transition metal vacancies to enhance energy density and cycle life. GENSIB applies a "genetic" approach to optimize redox orbitals using techniques like impedance spectroscopy, X-ray methods, and density functional theory (DFT) simulations. Data from experiments and DFT/Graph Neural Networks predict aging and second-life applications. GENSIB also uses MATLAB Simscape to simulate SIB performance, refining designs and bridging research with real-world needs, positioning SIBs as a sustainable, cost-effective alternative to lithium-ion batteries.

GREEN-MEM

Green materials for sustainable magneto-electronic memories

As compute energy usage becomes unsustainable in the era of ubiquitous data and AI computing, we need to develop materials and devices that enable super energy-efficient beyond-CMOS computing. The next generation of computing hardware will focus on low voltage switching and interconnects. Current proposals rely on the collective switch of order parameters like magnetization but still based on critical and potentially harmful materials as heavy metals and rare earths, which are unsustainable for environmental and geopolitical reasons. Here, we exploit breakthrough advances in the physics of low dimensional materials and spin-orbital phenomena to revolutionize magnetic storage devices by harnessing light and environmentally friendly materials. The results of GREEN-MEM will provide the semiconductor industry with the tools for re-industrializing the EU with the production of more sustainable, non-contaminant, electronics, maintaining the key knowhow and intellectual property in the EU.

GRIPHUS

Green Innovative Photocatalytic systems for CO2 Utilization to produce e- fuelS

GRIPHUS aims to produce e-fuels by valorizing CO2 using advanced photocatalytic membrane reactors. The project will design, build, operate, and validate a lab-scale prototype of an advanced photocatalytic process assisted by membranes. It focuses on CO2 reuse as a carbon carrier in the fuel cycle, producing e-fuels like methanol through hydrogenation with green hydrogen. The project combines experimental and theoretical activities, including multiscale modeling and quantum chemical simulations. GRIPHUS promotes e-fuel production with positive environmental impacts, fostering a circular economy in the EU. It redefines CO2 as a resource for green-chemicals and e-fuels, enhancing photocatalytic reaction efficiency and providing sustainable solutions. The project's results will benefit SMEs and large industries, driving innovation and commercialization in the e-fuels sector.

Hemp4Performance

Hemp Bast Composites for High-Performance Applications in Circular Economy

Rationale: By studying the utilization of hemp for advanced materials in the construction of buildings, we aim to relieve the burden on the forest raw material resource through a fast-growing annual plant. Objectives/results: (i) Development of biobased panels and profiles made of hemp stalks or hemp bast and innovative biobased resins with features to repair, recover both resin and hemp and reuse the recovered materials to produce new panels and profiles; (ii) Development of manufacturing processes aiming at optimized hemp cultivation and harvesting processes, and optimized manufacturing processes to form hemp and biobased resins to panels and profiles suitable for interior construction. Potential applications: Interior construction, mobility applications, sports equipment. Impact/benefits: Sustainable & cost-efficient processing methods for high quality materials/components made of hemp; Substitution of fossil-based materials with biobased materials; Increased material circularity.

HerAqua

Innovative nano-carbon based electrochemical monitoring of female hormones

The HerAqua project aims to address the pressing issue of hormone contamination in water, which impacts both human health and the environment. Hormones from pharmaceutical use, such as contraceptives and hormone therapy, are frequently found in water sources, where they disrupt ecosystems and potentially affect human health. This project proposes the development of an innovative, portable device for detecting hormone levels in water through advanced nanocarbon-based electrochemical sensors. By integrating eco-friendly materials and microfluidic technology, HerAqua's device will enable continuous monitoring of hormone pollutants in small water samples, offering a sustainable, cost-effective alternative to conventional testing methods. The project also highlights a life cycle approach to minimize environmental impact, positioning itself as a vital tool for protecting biodiversity and human well-being, aligning with goals for sustainable development and environmental preservation.

HYDRAGON

From Light to Energy: Synergetic Multifunctional Materials Driving Photoelectrochemical Hydrogen Generation

HYDRAGON project aims to advance research in hydrogen production through photoelectrochemical (PEC) water splitting from an innovative and original perspective. The focus is on using light-transparent flexible carbon materials, known for their versatility and low cost, as catalysts and supports in PEC cells. By fabricating hybrid composites with semiconductors that have suitable bandgaps, the project seeks to enhance hydrogen generation using sunlight from real and abundant water sources. Key materials include: supports (carbon textiles), semiconductors (metal-organic frameworks, perovskites, and metal oxides) as well as their composites, and co-catalysts (metal transition carbides/nitrides and phthalocyanines, as photosensitisers), with the final objective of maximising light absorption and minimising energy loss. The project targets the development of stable, reactive, and cost-effective electrode materials while advancing interface engineering to create efficient PEC devices.

HYPOLFAIL

Hydrogen-Induced Damage to Polymers at High Pressure: Understanding Interaction and Failure Mechanisms

Green hydrogen (gH2) is essential for a sustainable energy future, but it has inherent challenges for safe storage and transport, especially with traditional materials that are prone to hydrogen embrittlement and permeability issues. This calls for advanced materials capable of withstanding extreme pressure and temperature conditions without degradation. HYPOLFAIL aims to develop optimized polymeric materials with enhanced H2 compatibility and durability, specifically focusing on elastomers and thermoplastics for sealing and high-pressure gas storage applications. Using AI-driven multiscale modeling and in-situ/ex-situ experimental testing, the project will create polymers with improved permeation resistance (10%) and extended service life (20%), pioneering a "design THE materials" approach for sustainable economy applications. The project supports a more reliable, cost-effective H2 economy, which, aligns with EU climate goals, and strengthens Europe's position in the global H2 market.

InnoCoat4Plasma

Innovative, bio-based plasma coatings on micro- to nano-structured surfaces for microfluidic and riblet applications

Needs to be addressed: Foils for fluid-dynamics applications are usually produced from synthetic polymers and coated in complex, wet-chemical processes that are harmful to health and the environment. The SDGs, RRI and the circular economy postulate products that are bio-based, energy-efficient and recyclable. Objectives: The InnoCoat4Plasma project aims at the development of bio-based coatings with renewable, functionalized additives able to improve hydrophobic/hydrophilic and antimicrobial properties of imprinted recycled foils, deposited by atmospheric plasma techniques and optimized by multiscale modelling. Potential applications: Development of imprinted recycled foils with tailored surface properties for microfluidic and riblet applications in the food, cosmetics and paper production. Impact and potential benefits: The multidisciplinary consortium will contribute to advance the research and to deliver feasible solutions to the market with significantly improved ecological impact.

OCULUS

Operando Techniques for Conversion reaction engineering in high-energy Lithium SULfUr Solid state batteries

Clean, cost-efficient, and safe energy storage is a major technological challenge for Europe, creating an urgent need for advanced batteries with higher energy and lower weight. Solid-state lithium-sulfur batteries (LS-SSB) are considered a promising future storage technology; however, improving cycle stability, especially of the metallic lithium anode, remains essential. The main objective is to develop stable LS-SSBs using green, scalable manufacturing processes by implementing and developing innovative operando analyses. Safe and performance-enhanced solid-state batteries for battery-electric heavy vehicles and aviation are targeted, which will be supported by the OCULUS cell stack demonstration. The electrification of the mobility / aviation sector and the development of improved solid-state batteries is an emerging market opportunity, and companies along the value chain can profit from this this growth sector. OCULUS is aiming to bring innovations to this market.

PARACELSis

Parallel-connected calchopyrite-silicon based tandem cell

The PARACELSis project addresses the need for advancing high-efficiency Si-based tandem photovoltaic devices, while exploring alternative architectures with better tolerance to mismatching and reduced degradation risk, particularly in chemically unstable materials like perovskites. The main goal is to demonstrate the feasibility of a novel 3-terminal (3T) tandem photovoltaic device using stable materials, such as chalcopyrite and crystalline silicon, in a monolithically integrated, parallel configuration. The 3T solar cells will be assembled into practical 2T modules, compatible with conventional module interconnection systems used in commercial applications. Expected benefits include improved device stability, simplified architecture, reduced sensitivity to solar spectrum variations, and advancements from TRL 2 to 4-5.

PECZIB

Photo-electrochemical Hydrogen Generation Integrated with Photo-chargeable Zinc Ion Battery

In this project, novel heterojunction thin film electrode-based photo-electrochemical (PEC) water-splitting devices integrated with photo-chargeable zinc ion batteries (photo-ZIB) will be developed to provide hydrogen (H2) in a clean, sustainable, efficient, and cost-effective way. The bias potential required by the system to be produced is met by photo-ZIB, which can be directly charged by sunlight. Specifically, we propose to make heterojunctions of zinc oxide nanostructure with kesterite type and chalcogenide type semiconductor thin films for highly efficient PEC reactions. Besides compositionally complex ceramics will be used to improve the photo-anodes' stability and catalytic activity. Dark cathodes based on high-entropy ceramics will be obtained to provide a cost-effective alternative to current technology. Thus, it aims to design an innovative device that can be an alternative to the classically used photovoltaic solar cell-electrolyzer systems in terms of cost and efficiency.

PERFORMANCE

Optical sensors for detection of small organic molecules

Rationale / Needs to be addressed: Detecting aldehydes, key biomarkers for diagnosing various diseases, requires innovative sensitive, specific, and rapid strategies, as current diagnostic tools are often expensive, complex, and lack accuracy, particularly in resource-limited settings. Objectives: PERFORMANCE aims to develop hybrid plasmonic sensors using three-dimensional networks of metal nanoparticles and molecular receptors, combining surface-enhanced Raman scattering and electrochemical detection for ultrasensitive, selective, and real-time aldehyde identification. Potential applications: Our technology enables point-of-care diagnostics for early disease detection and monitoring, with additional uses in environmental monitoring, food safety, and industrial aldehyde detection. Impact and potential benefits: PERFORMANCE delivers cost-effective, portable sensors that enhance healthcare outcomes, promote sustainable diagnostics, and improve global healthcare access.

Photohmic

Oxide-based photonic crystal ohmic contacts for efficient GaN-based PCSEL diodes

GaN Photonic Crystal (PC) Surface Emitting Lasers (PCSEL) are new, high power and single mode diode (LD) architectures which might revolutionize the power LD market. However, their potential is hindered by the requirement of very challenging sub-micrometer etching of the PC into GaN, generating defects lowering the efficiency of the LD. The objective of the project is to facilitate the technology of fabricating GaN PCSELs by developing ZnO:Al-based top ohmic contacts hosting the photonic crystals and acting as a current spreading layer, removing the need for degradation-inducing etching of the PCs into GaN. The new LDs can find applications in laser displays, automotive beams, or machining. The idea is a paradigm shift from the current developments in this hot topic. It will facilitate processing and improve the quality of the crystal structures, translating to better LDs at lower cost.

PhotoPrint

Photo-Atomic Layer Printing

Chip manufacturing is resource-intensive relying on critical raw materials (CRMs). Methods are rigid to change and sensitive to issues in supply chains. Essential thin-film patterning by photolithography makes lots of toxic waste. Needed better chip performance adds environmental risks in manufacturing. Objectives: Proof of concept, photolithography-free-thin-film deposition equipment for chip manufacturing with Photo-assisted Atomic Layer Deposition. New process chemistries enabling direct pattern printing. Validated technology via novel neuromorphic chips in sensors and memristors. Communicate, disseminate, and scale up the developed solutions. PhotoPrint will enable novel chip designs, like neuromorphics, and circuitry on various products. Beyond the project, PhotoPrint will revolutionize chip manufacturing with reduced environmental footprint. PhotoPrint will be accessible to a broad audience, facilitating inclusiveness and microelectronics for a sustainable and responsible society

PRE-ActiVer

Prefabricated, lightweight, energy-active wall panel for zero-emission buildings

Rationale / Needs to be addressed: The PRE-ActiVer address the goal of the European construction market: to reduce CO2 emissions and energy demand through zero-carbon buildings, facing the need for advancement in the field of BIPV, engaging with circularity and environmental dimensions. Objectives: To develop, construct and investigate the lightweight wall panel equipped with interconnected PV panels and a heat dissipation system. The ActiVer will be prefabricated, easy to assemble and maintain, with replaceable PV elements. Potential applications: The potential application of developed façade systems will be unlimited within the building industry, including the newly designed and existing buildings. Impact and potential benefits: The PRE-ActiVer project is within the line of the growing need for prefabrication in the construction industry, reusing of building materials, on-site waste reduction and enhancement of building energy performance. Expected energy potential: 80-180 kWh/(m2·a).

REECovery

Circular economy through a sustainable recovery technology of critical resources (REEs) from selected waste materials

REEs recovery from waste resources is necessary due to these elements are established by EU as a critical raw materials. Also searching eco friendly technology for REE extraction is strongly recommended for environment carrying. Project objective is investigation of solid waste from 3 different countries (Poland, Czech Republic and Turkiye) from point of view REEs content in order to elaborate efficiency concept of technology REEs recovery from solid wastes. Therefore, Partners from mentioned countries will be involved. Investigated waste will be i.e. fly ashes, post flotation waste, used PV panels and others. The Partners will choose the most promising waste in country that are rich in REEs content. The results obtained elaborate in the project will enable to elaborate full scale technology of REEs recovery from selected waste. Find a new rich in REEs waste and new eco-friendly technology of REEs recovery will have an impact on sustainable development & CE trends recommended by EU.

REGENESIS

REvolutionising bone and cartilaGE reconstruction through Novel cell-instructive biomaterial and peptide-Enhanced Stem cell Immobilization Strategy

Osteochondral defects pose a significant challenge in medicine, with current treatments failing to restore cartilage-bone integration, leading to joint degeneration and disabilities. REGENESIS tackles this unmet clinical and market need by developing biomaterial for treating osteochondral microfractures and injuries. Our multidisciplinary approach combines pharmacological stem cell mobilisation and use of homing peptides for precise cell recruitment, cytocompatible photocrosslinking for safety and stability with mechanotransductive biomaterial for tissue-specific repair. REGEniq material offers an optimal solution for knee, ankle and phalange joint injuries while improving outcomes in surgeries like arthroscopy. Advancing REGEniq from TRL3 to TRL5, the project bridges key clinical care and market gaps, ensuring better patient outcomes, lower costs, and fast adoption of regenerative technologies. Clinicians, veterinarians and researchers stand to benefit from REGENESIS's implementation.

RESH

Renewable Energy via Sustainable Hydrogen

RESH proposes clean and sustainable low-carbon energy technology with a radically new idea for green hydrogen production. It focuses on photo-electrochemical water splitting enriched with piezo- and pyrocatalysis, as well as novel Ni-based noble-metal-free co-catalysts, to maximize solar fuel production. The idea is based on heterostructures that combine protective oxide layers with a semiconductor Si in an epitaxial way using graphene-based interfaces and pulsed laser deposition technology for atomically controlled growth. Among most environmentally relevant aspects of the project is the reuse of end-of-life solar panels in photo-electrochemical devices, after their integration with oxide heterostructures. The goal of the project is to achieve beyond the state-of-the-art solar-to-hydrogen conversion efficiency of >10% with long-term stability in the ambient environment. Finally, RESH proposes green ammonia production to develop scalable and efficient storage and distribution of H2.

SeSeoS

Revealing of Se-based semiconductors for electro-optical gas sensors

The selectivity of many gas sensors is still an unsolved problem, as most gas-sensing materials are sensitive to different volatile analytes. We propose to address this shortcoming by developing Se-based semiconductors with electrical and optical parameters sensitive to an analyte. The objectives are novel Se-based compounds and electro-optical gas sensors, intending to reach essential selectivity and a detection limit of less than 500 ppb [analyte]. The proposed gas-sensing technology has industrialization potential in markets that contribute to environmental monitoring, industrial and commercial development, and medical diagnosis while considering the requirements for fast, convenient, and accurate monitoring of gas concentrations. The SeSeoS project primarily focuses on the design and implementation of innovative products that address significant public health concerns.

SMARTPIEZO

Smart Piezoelectric Bio-based Osteochondral Construct as a Model for Drug Testing and Implant for Joint Defects

Needs: Joint defects (JD) from trauma, osteoarthritis, arthritis, or cancer represent a major challenge in healthcare due to poor treatment options and limited regeneration. Objectives: Project aims to develop a bio-based, piezoelectric osteochondral construct sPiezoBio for JD repair and drug testing. The primary objectives are: to develop piezoelectric and bio-based materials; design two osteochondral repair products; overcome current limitations in JD repair materials by creating multifunctional, biomimetic constructs; enhance osteogenesis and chondrogenesis through ultrasound and mechanical stimulation. Applications: The sPiezoBio can be applied in JD treatment, offering solutions for JD filling. They will also serve as in-vitro osteochondral tissue models for drug and treatment testing. Impact&Benefits: sPiezoBio promotes cellular growth and regeneration. It has the translational potential to improve patient outcomes, advance JD treatment, and accelerate drug development.

SURPHACE

SUrface enhanced Raman spectroscopy for PatHogen sensing and Anti-pathogenic Coating development

The biological contamination of surfaces and air poses significant health hazards. It is essential to develop anti-pathogen surfaces to decrease pathogen transmission and sensing technologies enabling rapid, on-site analysis in various environmental and clinical settings. SURPHACE' Innovation Objectives focus on safe and sustainable development of smart surfaces that exhibit sanitizing & sensing capacity to reduce the pathogenic load, employing green & circular processes and data-driven optimization for function, safety, and sustainability. Key Results & Applications, is the application in air filters and tangible surfaces avoiding respiratory disease transmission also in combination with biosensing capabilities to monitor pathogens. Expected Impact & Benefits are smart surfaces and pathogen-monitoring that enhance infection control, reduce disease transmission, enable rapid detection, and support sustainable healthcare practices, leading to better efficiency and economic results.