

Keywords – purpose and general recommendations

In M-ERA.NET, keywords are used in the context of the centralized evaluation of proposals to allow for a first screening of the scope of the proposals and the preliminary selection of potential evaluators. Keywords are not an evaluation criterion but they are crucial for the identification of the best suited evaluators for a given proposal.

The ensemble of chosen keywords must convey enough information to pre-select a group of potentially suitable evaluators within a vast pool of experts (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques). Selecting keywords that are too general, too specific or that don't allow for a general overview of the scope of the project hinders the workflow of the centralized evaluation.

Please verify the following lists before adding “additional keywords” to describe your project. Adding a new keyword to describe a similar/related concept may result in false negatives in the evaluator pre-selection process.

Please avoid choosing redundant keywords.

Please avoid using acronyms as a keyword, as they may have different meanings across different fields.

Practical examples:

- *A project submitted to Topic 4 – Functional Materials should not have “Functional Materials” among its keywords: no relevant information added.*
- *“3D printing” is a predefined keyword. Additional keywords should not contain “3D printed”, “3D printed structures”, “3D printing technology” or “3D-printing”.*
- *“Lithium Batteries” is a predefined keyword. Additional keywords should not contain “Li Batteries”.*
- *A cluster of keywords such as “advanced composite materials; advanced multifunctional materials; characterization” does not provide enough information about the scope of the project.*

Predefined keywords - mandatory

- **Level 1 – Topic specific KWs**
These are the keywords present in the Call Documents, defined by M-ERA.NET's Strategic Expert Group, and should be used to define the positioning of your project within the chosen Topic. These are broad keywords, please choose the ones that relate to your project even if they are not an exact match.
- **Level 2 – General KWs**
List of keywords common to all Topics. Some of these keywords might be broad, please choose the ones that relate to your project even if they are not an exact match.

Additional keywords - optional

After picking a total of at least 5 (and no more than 20) keywords from the previous lists, if necessary you may inform additional specific keywords to describe your individual project. These keywords must not be similar to the predefined keywords. These keywords can contain more detailed/specific information about the project.

Keyword lists

To facilitate the choice of keywords, you will find below the complete lists of predefined keywords proposed in the submission platform.

1 - Topic Specific Keywords:

Topic 1 - Materials for energy storage and distribution systems

- Aqueous batteries
- Artificial intelligence for materials discovery
- Battery materials
- Bio-based materials
- Ceramic heat storage
- CRM reduction / replacement / substitution
- Electrochemical energy storage
- Energy distribution
- Energy efficiency
- Energy storage
- Energy carriers distribution
- Energy carriers storage
- Hybrid energy storage, Long duration energy storage
- Materials safety
- Membranes Next-generation batteries
- Phase change materials
- Post lithium ion batteries
- Recycled Materials
- Redox-flow batteries
- Second-life materials
- Solid sorbent
- Supercapacitors
- Superconductors
- Thermal storage
- Thermochemical materials

Topic 2 - Materials for energy conversion

- Circularity of materials and devices
- Clean mobility
- CRM substitution
- Devices stability
- Electrolysers
- Energy efficiency
- E-fuels
- Fuel cells
- Hydroelectric energy
- Lightweight materials
- Life Cycle Assessment (LCA)
- Modelling / Simulations
- Ocean energy
- Photovoltaics
- Piezoelectric materials
- Power to X
- Thermoelectric
- Triboelectric (X-electric)
- Wind energy

Topic 3 - Innovative surfaces, coatings and interfaces

- Adaptive coatings
- Adhesive properties
- Advanced coatings
- Anticorrosion
- Anti/de-icing
- Antimicrobial surfaces
- Anti-slippery
- Anti-wear
- Barrier coating
- Bio-based or Bioinspired coatings
- Biocompatibility
- Bio-interfaces
- Biomimetic surfaces
- Catalytic properties
- Energy saving
- Functionalisation
- High temperature coating applications
- Innovative surfaces
- Interfaces
- Interphases
- Multifunctional coatings
- Nano-engineered coatings
- Noise mitigation
- Optical, Electrical and magnetic surface properties
- Residual stresses
- Self-healing properties
- Sensing surfaces
- Smart coatings
- Structured surfaces
- Surface characterisation techniques
- Surface modification by Additive Manufacturing
- Surface technologies
- Textured surfaces
- Thermal barrier
- Thin films
- Tribological coatings
- Tribology
- Upscaling of surface treatments

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Topic 4 - Innovative functional materials with defined architectures

- 2D materials
- Acoustic properties
- Additive manufacturing / 3D printing
- Bio-based materials
- Biocompatible
- Biological applications
- Bio-mimetic
- Carbon fibres
- Casting
- Catalysis
- Ceramic matrix composite
- Concrete
- Controlled release
- Construction / building materials
- Covalent adaptable network
- Degradability
- Eco-design
- Elastomer
- Electrical properties
- Electro- / photochromic materials
- Energy-efficient processes
- Fibre
- Filler
- Fire safety
- Geopolymer
- Healthcare
- Heterostructures
- Innovative alloys
- Joining
- Laser processing
- Low-dimensional materials
- Magnetic properties
- Mechanical properties
- Membranes
- Metal matrix composite
- Metal-organic frameworks
- Metamaterials
- Nanomaterials
- Natural materials
- Networks / gels
- Optical properties
- Photonic properties
- 2D Piezo- materials
- Plasma processing
- Plasmonics
- Polymer matrix composite

- Polymers
- Porous materials
- Printing
- Processing technologies
- Quantum materials
- Recyclability
- Safe and Sustainable by Design (SSbD)
- Self-healing
- Sensing
- Solvent-free processing
- Thermal properties
- Thermoplastic
- Thermoset
- Topological structures
- Triboelectric
- Tribological properties
- Upcycling
- Weight reduction / lightweighting

Topic 5 - Materials Addressing Environmental Challenges

- Air treatment
- Bio-based materials
- Biodegradation
- Circularity
- CRM substitution
- Degradable materials
- Emerging pollutants
- Hazard materials substitution
- Life Cycle Assessment (LCA)
- Material life extension
- Material recyclability
- Product life extension
- Safe and Sustainable by Design (SSbD)
- Soil treatment
- Sustainable processing
- Waste recycling
- Waste reduction
- Wastewater treatment
- Water conditioning

Topic 6 - Next Generation Materials for Electronics

- 5G/6G connectivity
- Bioelectronics
- Flexible electronics
- Integration
- High-power-control electronics
- Memories
- Neuromorphic electronics
- Organic electronics
- Optoelectronics
- Packaging and housing
- Photonics
- Printed electronics
- Sensors
- Spintronics
- Sustainable processing
- Thermal management
- Ultralow-power electronics

2 - General KWs

KWs from all previous lists will also be available in the platform as General KWs

- 21 Piezo- materials
- 2D materials
- 2D polymers
- 3D cell growth
- 3D components
- 3D materials
- 3D model
- 5G/6G connectivity
- Ab initio simulations
- Acoustic properties
- Actuators
- Adaptive coatings
- Additive manufacturing / 3D printing
- Adhesive properties
- Adsorption
- Advanced battery design
- Advanced coatings
- Advanced simulation
- Aerogels
- Aerospace devices
- Air treatment
- Aluminium
- Amorphous materials
- Animal models
- Anisotropy
- Anti/de-icing
- Antibacterial properties
- Anticorrosion
- Antimicrobial surfaces
- Antipathogen coatings
- Anti-slippery
- Anti-wear
- Aqueous batteries
- Artificial intelligence for materials discovery
- Atomic layer deposition
- Atomic layer etching
- Atomization
- Aviation materials
- Band gap
- Barrier coating
- Batteries
- Battery materials
- Battery production
- Bio based composites
- Bio imaging
- Bio-based materials
- Bio-based or Bioinspired coatings
- Biocompatibility
- Biocompatible
- Biodegradable fibers
- Biodegradation
- Bioelectronics
- Biofilms
- Bioink
- Bio-interfaces
- Biological applications
- Biological properties
- Biological waste
- Biomass
- Biomedical application
- Bio-mimetic
- Biomimetic surfaces
- Bioplastics
- Biotechnology
- Bone implant
- Building engineering
- Cancer therapy
- Carbon based materials
- Carbon coating
- Carbon fibres
- Carbon footprint
- Carbon nanotubes
- Casting
- Catalysis
- Catalytic properties
- Cathode materials
- Cellular materials
- Ceramic heat storage
- Ceramic matrix composite
- Characterization
- Charge storage
- Chemical engineering
- Chemical vapour deposition
- Chiral nanostructures
- Circular economy
- Circularity
- Circularity of materials and devices
- Civil engineering
- Clays
- Clean mobility
- CO₂ capture and reduction
- CO₂ conversion
- CO₂ footprint
- CO₂ valorisation
- Coating process
- Composite multilayers
- Computational approaches
- Computational engineering
- Computational materials design
- Computational physics
- Concrete
- Construction / building materials
- Controlled release
- Corrosion resistance
- Covalent adaptable network
- CRM reduction / replacement / substitution
- CRM substitution
- Crystal growth
- Data-driven machine learning
- Deep learning
- Degradability
- Degradable materials
- Deposition process
- Deposition techniques
- Devices stability
- Digitalization
- Dopants
- Drug delivery systems
- Durability
- Eco-design
- E-fuels
- Elastomer
- Electric cars
- Electric field
- Electrical properties
- Electrical signals
- Electro- / photochromic materials
- Electrocatalysis
- Electrochemical energy conversion
- Electrochemical energy storage
- Electrochemical oxidation
- Electrochemistry
- Electrode lifetime
- Electrode surface
- Electrodeposition
- Electrolysers

- Electromagnetic shielding
- Electron microscopy
- Electrospinning
- Electrospray deposition
- Emerging pollutants
- EMI shielding
- Energy carriers distribution
- Energy carriers storage
- Energy distribution
- Energy efficiency
- Energy saving
- Energy storage
- Energy transition
- Energy-efficient processes
- Environmental applications
- Environmental impact
- Epitaxial heterojunction
- Eutrophication
- Failure analysis
- Fast-charging capability
- Fatigue resistance
- Ferroelectrics
- Fibre
- Fibre reinforced polymeric materials
- Filler
- Filtration membranes
- Fire safety
- Flame retardants
- Flexible devices
- Flexible electronics
- Flow reactor
- Foam
- Food industry
- Food packaging
- Food safety
- Frequency range
- Fuel cells
- Functional coatings
- Functional gradient
- Functional materials
- Functional nanostructures
- Functional textiles
- Functionalisation
- Functionalised products
- Gallium nitride
- Gas emissions
- Gas permeability
- Gas sensors
- Geopolymer
- Glass
- Grain boundaries
- Graphene
- Graphene oxide
- Graphite electrodes
- Green chemistry
- Green concrete
- Green electronics
- Green energy
- Green functional materials
- Green hydrogen
- Greenhouse gas capture
- Greenhouse gas conversion
- Greenhouse gas emission reduction
- Halide perovskites
- Haptic actuators
- Hazard materials substitution
- Hazardous substances
- Healing
- Healthcare
- Heat recovery
- Heat transfer
- Heating/cooling devices
- Heterostructures
- High entropy alloy
- High temperature
- High temperature coating applications
- High-power-control electronics
- High-Pressure
- High-throughput
- Hybrid energy storage, Long duration energy storage
- Hybrid nanocomposites
- Hybrid processes
- Hybrid structures
- Hydroelectric energy
- Hydrogel
- Hydrogen evolution reaction
- Hydrogen generation
- Impact resistance
- Impedance spectroscopy
- Implants
- In situ characterization
- Industrial applications
- Inkjet printing
- Innovation chain
- Innovative alloys
- Innovative batteries
- Innovative coatings
- Innovative components
- Innovative interfaces
- Innovative surfaces
- In-situ/Operando analysis
- Integration
- Interfaces
- Internet of Things
- Interphases
- In-vitro testing
- Ion diffusion
- Ion implantation
- Ionic conductivity
- Ionic conductor
- Ionic liquids
- Ionomer
- Joining
- Laser beam shaping
- Laser cladding
- Laser powder bed fusion
- Laser processing
- Layered material
- Lead-free ceramics
- Life Cycle Assessment (LCA)
- Light absorption
- Light emitting materials
- Lightweight materials
- Lignin
- Liquid / Resin Molding
- Liquid phase epitaxy
- Liquid state batteries
- Lithium anode
- Lithium battery
- Lithium metal
- Long-term resilience
- Low friction materials
- Low power device
- Low-dimensional materials
- Machine learning
- Magnetic properties
- Magnetron sputtering
- Manufacturing methods
- Manufacturing technologies
- Market analysis
- Material chemistry
- Material design
- Material life extension
- Material performance
- Material recyclability
- Material recycling
- Materials development
- Materials for energy
- Materials processing
- Materials safety
- Matrix composites
- Mechanical properties
- Mechanoluminescence
- Medical device
- Medical imaging

- Membrane electrode
- Membranes
- Memories
- Metal air batteries
- Metal anodes
- Metal foams
- Metal forming
- Metal hydrides
- Metal matrix composite
- Metal nanoparticles
- Metal oxides
- Metal-organic frameworks
- Metamaterials
- Micro thermal management
- Microelectronics
- Microfluidics
- Micromechanics
- Microstructures
- Modelling / Simulations
- Molecular design
- Molecular modeling
- Molten salt
- Multifunctional coatings
- Multifunctional materials
- Multi-scale analysis
- Multiscale modeling
- Multivalent batteries
- Mxenes
- Nano composite Fiber
- Nanocarbon
- Nanocomposite coatings
- Nano-engineered coatings
- Nanoengineering
- Nanomaterials
- Nanotechnology
- Nanotribology
- Nanowires
- Natural materials
- Networks / gels
- Neuromorphic Computing
- Neuromorphic electronics
- Neutron detector
- Next generation batteries
- Next generation cathode
- Nitrides
- Noise mitigation
- Non-invasive sensors
- Ocean energy
- Operando analysis
- Optical properties
- Optical, Electrical and magnetic surface properties
- Optoelectronics
- Organic chemistry
- Organic electronics
- Organic light-emitting diode
- Organic semiconductor
- Organic solar cells
- Organ-on-chip
- Oxides
- Oxygen evolution reaction
- Oxygen reduction reaction
- Packaging and housing
- Perovskite
- Persistent luminescence
- PET
- PFAS removal
- Phase change materials
- Phosphors
- Photodiode
- Photon upconversion
- Photonic devices
- Photonic properties
- Photonics
- Photovoltaics
- Piezoceramics
- Piezoelectric materials
- Plasma processing
- Plasma-enhanced chemical vapour deposition
- Plasmonics
- Pollution
- Polymer electrolytes
- Polymer matrix composite
- Polymers
- Porous materials
- Post lithium ion batteries
- Post-consumer polyolefins
- Post-processing
- Powder regeneration
- Power to X
- Pressure/strain sensing
- Printed electronics
- Printing
- Processing technologies
- Processing-structure-property relationships
- Product development
- Product life cycle
- Product life extension
- Proton Exchange Membrane
- Proton exchange membrane fuel cell
- Prototyping
- Pulsed laser deposition
- Quantum materials
- Radiation detector
- Reactive extrusion
- Reconfigurable surfaces
- Recyclability
- Recyclable materials
- Recycled Materials
- Redox-flow batteries
- Regenerative medicine
- Reinforcing particles
- Reliability
- Remediation
- Renewable energy
- Renewable materials
- Renewable resources
- Residual stresses
- Reuseable materials
- Robotics
- Safe and Sustainable by Design (SSbD)
- Scalability
- Scanning probe microscopy
- Scintillating screens
- Scintillators
- Screen printing
- Second-life materials
- Selective Laser Sintering
- Self-assembly
- Self-healing
- Self-healing properties
- Selfsustaining system
- Semiconductors
- Sensing
- Sensing surfaces
- Sensors
- Silicon
- Single crystals
- Smart coatings
- Smart materials
- Smart packaging
- Smart products
- Smart textiles
- Smart windows
- Sodium ion batteries
- Soft actuators
- Soft robotics
- Soil treatment
- Solid oxide electrolysis
- Solid sorbent
- Solid state batteries
- Solid state materials
- Solvent-free processing
- Spectroscopic techniques
- Spinels

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- Spintronics
- Sputtering
- SSbD - safe and sustainable by design
- Structured surfaces
- Superalloy
- Supercapacitors
- Superconductors
- Superhydrophobic
- Surface characterisation techniques
- Surface modification by Additive Manufacturing
- Surface technologies
- Sustainable energy systems
- Sustainable processing
- Synthesis conditions
- Synthetic composites
- Tailored property
- Textured surfaces
- Theoretical modeling
- Thermal barrier
- Thermal management
- Thermal properties
- Thermal Spray
- Thermal storage
- Thermochemical materials
- Thermoelectric
- Thermoelectric generators
- Thermoplastic
- Thermoresponsive polymer
- Thermoset
- Thin films
- Tomography
- Topological structures
- Transducers
- Transition metals
- Transparent conductive films
- Transport properties
- Transportation sector
- Triboelectric
- Triboelectric (X-electric)
- Tribological coatings
- Tribological properties
- Tribology
- Tunable materials
- Two-photon absorption
- Ultralow-power electronics
- Upcycling
- Upscaling of surface treatments
- Vitrimer
- Waste recycling
- Waste reduction
- Wastewater treatment
- Water conditioning
- Water electrolysis
- Water management
- Wear resistant coating
- Weight reduction / lightweighting
- Wide band gap oxides
- Wind energy
- X-ray tomography
- Zeolites
- Zinc oxide
- Zinc-ion batteries