## 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 - Sustainable materials for energy applications

- Advanced catalysts
- Aqueous batteries
- Artificial intelligence
- Battery materials
- Critical raw materials
- Electrochemical storage
- Electrolysers
- Energy efficiency
- Energy harvesting
- Energy storage
- Fuel cells
- Heat storage
- Hydrogen
- Hydrogen distribution
- Hydrogen storage
- Life cycle assessment
- Lightweight
- Long duration energy storage
- Magnets
- Materials safety
- Modelling
- Phase change materials
- Photovoltaic materials
- Piezoelectric materials
- Power to X
- Redox-flow batteries
- Solar cells
- Thermochemical materials
- Thermoelectric materials
- Triboelectric materials
- Wind turbines

### Topic 2 - Innovative Surfaces, Coatings and Interfaces

- Advanced coatings
- Anticorrosion
- Anti-icing
- Antimicrobial coatings
- Antiwear
- Bio-based coatings
- Bioinspired
- Bio-interfaces
- Biomimetic surfaces
- Functionalisation
- Innovative surfaces
- Interfaces
- Interphases
- Modelling
- Multifunctional coatings
- Nano-engineered coatings
- Scale up
- Self-healing
- Sensing surfaces
- Smart coatings
- Structured surfaces
- Surface characterisation techniques
- Surface technologies
- Textured surfaces
- Thin films
- Tribology

### Topic 3 - Advanced composites and lightweight materials

- Acoustic
- Alloy
- Automation
- Bio-based materials
- Biocompatible
- Biological
- Casting
- Ceramic matrix composite
- Combustion
- Compostable
- Concrete
- Dielectric
- Elastomer
- Fiber
- Filler
- Fire safety
- Gel
- Geopolymer
- Insulation
- Joining
- Laser processing
- Lightweight
- Liquid / Resin molding
- Magnetic
- Mechanical
- Metal matrix composite
- Meta-material
- Mineral
- Natural material
- Optical
- Piezo
- Plasma processing
- Polymer matrix composite
- Porosity
- Porous
- Powder metallurgy
- Printing
- Self-healing
- Sensing
- Sintering
- Solution processing
- Solvent-free processing
- Textile
- Thermal
- Thermoplastic
- Thermoplastic processing
- Thermoset
- Thin layer processing

**Topic 4 - Functional Materials**

- 2D materials
- Bio-based materials
- Catalysis
- Construction
- Eco-design
- Electro/photochromic materials
- Energy-efficient processes
- Healthcare
- Heterostructures
- Magnetic properties
- Membranes
- Metal-organic frameworks
- Metamaterials
- Optical properties
- Photonic properties
- Piezoelectricity
- Plasmonics
- Polymers
- Porous materials
- Processing technologies
- Quantum technologies
- Safe and Sustainable by Design (SSbD)
- Self-healing
- Sensors
- Thermal properties
- Thermoelectric properties
- Topological structures
- Triboelectric properties
- Tribological properties
- Upcycling
- Wearables

**Topic 5 - Materials Addressing Environmental Challenges**

- Air treatment
- Bio-based materials
- Biodegradation
- Circularity
- CRM substitution
- Degradable materials
- Emerging pollutants
- Hazardous materials substitution
- Life-cycle perspective
- Material life extension
- Material recyclability
- Product life extension
- Safe and Sustainable by Design (SSbD)
- Soil treatment
- Sustainable processing
- Waste recycling
- Waste reduction
- Water treatment

**Topic 6 - Next Generation Materials for Electronics**

- Bioelectronics
- Digital microfluidics
- Field-effect transistors
- Flexible electronics
- Heterogeneous integration
- High-power-control electronics
- Laser processing
- Magnetic materials
- Molecular electronics
- Photodetectors
- Printed electronics
- Responsible electronics
- Sustainable semiconductor processing
- Ultralow-power electronics
- Unconventional electronics

**2 - General KWs**

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

- 2D polymers
- 3D cell growth
- 3D components
- 3D materials
- 3D model
- Ab initio simulations
- Actuators
- Additive manufacturing / 3D printing
- Adsorption
- Advanced battery design
- Advanced simulation
- Aerogels
- Aerospace devices
- Aluminium
- Amorphous materials
- Animal models
- Anisotropy
- Anti/de-icing
- Antibacterial properties
- Antipathogen coatings
- Atomic layer deposition
- Atomic layer etching
- Atomization
- Aviation materials
- Band gap
- Batteries
- Battery production
- Bio based coatings
- Bio based composites
- Bio imaging
- Biodegradable fibers
- Biofilms
- Bioink
- Biological properties
- Biological waste
- Biomass
- Biomedical application
- Biomimetics
- Bioplastics
- Biotechnology
- Bone implant
- Building engineering
- Cancer therapy
- Carbon based materials
- Carbon coating
- Carbon footprint
- Carbon nanotubes
- Catalysts
- Cathode materials
- Cellular materials
- Characterization
- Charge storage
- Chemical engineering
- Chemical vapour deposition
- Chiral nanostructures
- Circular economy
- Civil engineering
- Clays
- CO2 capture and reduction
- CO2 conversion
- CO2 footprint
- CO2 valorisation
- Coating process
- Composite multilayers
- Computational approaches
- Computational engineering
- Computational materials design
- Computational physics
- Corrosion resistance
- Crystal growth
- Data-driven machine learning
- Deep learning
- Deposition process
- Deposition techniques
- Digitalization
- Dopants
- Drug delivery systems
- Durability
- Electric cars
- Electric field
- Electrical properties
- Electrical signals
- Electrocatalysis
- Electrochemical energy conversion
- Electrochemical energy storage
- Electrochemical oxidation
- Electrochemistry
- Electrode lifetime
- Electrode surface
- Electrodeposition
- Electromagnetic shielding
- Electron microscopy
- Electrospinning
- Electrospray deposition
- EMI shielding
- Energy transition
- Environmental applications
- Environmental impact
- Epitaxial heterojunction
- Eutrophication
- Failure analysis
- Fast-charging capability
- Fatigue resistance
- Ferroelectrics
- Fibre reinforced polymeric materials
- Filtration membranes
- Flame retardants
- Flexible devices
- Flow reactor
- Foam
- Food industry
- Food packaging
- Food safety
- Frequency range
- Functional coatings
- Functional gradient
- Functional materials
- Functional nanostructures
- Functional textiles
- Functionalised products
- Gallium nitride
- Gas emissions
- Gas permeability
- Gas sensors
- 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
- Hazardous substances
- Healing

- Heat recovery
- Heat transfer
- Heating/cooling devices
- High entropy alloy
- High temperature
- High-Pressure
- High-throughput
- Hybrid nanocomposites
- Hybrid processes
- Hybrid structures
- Hydrogel
- Hydrogen evolution reaction
- Hydrogen generation
- Impact resistance
- Impedance spectroscopy
- Implants
- In situ characterization
- Industrial applications
- Inkjet printing
- Innovation chain
- Innovative batteries
- Innovative coatings
- Innovative components
- Innovative interfaces
- In-situ/Operando analysis
- Internet of Things
- In-vitro testing
- Ion diffusion
- Ion implantation
- Ionic conductivity
- Ionic conductor
- Ionic liquids
- Ionomer
- Laser beam shaping
- Laser cladding
- Laser powder bed fusion
- Layered material
- Lead-free ceramics
- Light absorption
- Light emitting 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
- Magnetron sputtering
- Manufacturing methods
- Manufacturing technologies
- Market analysis
- Material chemistry
- Material design
- Material performance
- Material recycling
- Materials development
- Materials for energy
- Materials processing
- Matrix composites
- Mechanoluminescence
- Medical device
- Medical imaging
- Membrane electrode
- Metal air batteries
- Metal anodes
- Metal foams
- Metal forming
- Metal hydrides
- Metal nanoparticles
- Metal oxides
- Micro thermal management
- Microelectronics
- Microfluidics
- Micromechanics
- Microstructures
- Molecular design
- Molecular modeling
- Molten salt
- Multifunctional materials
- Multi-scale analysis
- Multiscale modeling
- Multivalent batteries
- Mxenes
- Nano composite Fiber
- Nanocarbon
- Nanocomposite coatings
- Nanoengineering
- Nanomaterials
- Nanotechnology
- Nanotribology
- Nanowires
- Neuromorphic Computing
- Neutron detector
- Next generation batteries
- Next generation cathode
- Nitrides
- Non-invasive sensors
- Operando analysis
- Optoelectronics
- Organic chemistry
- Organic light-emitting diode
- Organic semiconductor
- Organic solar cells
- Organ-on-chip
- Oxides
- Oxygen evolution reaction
- Oxygen reduction reaction
- Perovskite
- Persistent luminescence
- PET
- PFAS removal
- Phosphors
- Photodiode
- Photon upconversion
- Photonic devices
- Piezoceramics
- Plasma-enhanced chemical vapour deposition
- Pollution
- Polymer electrolytes
- Post-consumer polyolefins
- Post-processing
- Powder regeneration
- Pressure/strain sensing
- Processing-structure-property relationships
- Product development
- Product life cycle
- Proton Exchange Membrane
- Proton exchange membrane fuel cell
- Prototyping
- Pulsed laser deposition
- Radiation detector
- Reactive extrusion
- Reconfigurable surfaces
- Recyclability
- Recyclable materials
- Regenerative medicine
- Reinforcing particles
- Reliability
- Remediation
- Renewable energy
- Renewable materials
- Renewable resources
- Reuseable materials
- Robotics
- Scalabililty
- Scanning probe microscopy
- Scintillating screens
- Scintillators

- Screen printing
- Selective Laser Sintering
- Self-assembly
- Selfsustaining system
- Semiconductors
- Silicon
- Single crystals
- Smart materials
- Smart packaging
- Smart products
- Smart textiles
- Smart windows
- Sodium ion batteries
- Soft actuators
- Soft robotics
- Solid oxide electrolysis
- Solid state batteries
- Solid state materials
- Spectroscopic techniques
- Spinels
- Spintronics
- Sputtering
- SSbD - safe and sustainable by design
- Superalloy
- Supercapacitors
- Superhydrophobic
- Sustainable energy systems
- Synthesis conditions
- Synthetic composites
- Tailored property
- Theoretical modeling
- Thermal management
- Thermal Spray
- Thermoelectric generators
- Thermoresponsive polymer
- Tomography
- Transductors
- Transition metals
- Transparent conductive films
- Transport properties
- Transportation sector
- Tunable materials
- Two-photon absorption
- Vitrimer
- Wastewater treatment
- Water electrolysis
- Water management
- Wear resistant coating
- Wide band gap oxides
- X-ray tomography
- Zeolites
- Zinc oxide
- Zinc-ion batteries