Integrated Computational Materials, Process and Product Engineering – IC-MPPE 2022

5 May 2022 - 6 May 2022

Live Congress Leoben

Scientific Programme

The conference aims to bring together guests and partners from industry and university research institutes in the framework of the COMET IC-MPPE research programme.

The conference will be organised in sessions on the following core topics of the IC-MPPE programme:

Advanced materials and analytics for extreme loading conditions

Main topic of this session is to present and discuss leading-edge developments in characterization and modelling of materials under extreme loading conditions.
The focus lies on characterization and modelling of materials under high thermal and mechanical loads including high numbers of loading cycles. The presented industrial application cases range from structural components (railway sector, ...) via industrial production (metal machining tools, ...) to high temperature applications (in e.g. aircraft turbines, ...).
Subsessions will cover the topics “Special alloys for special applications” and “Hard metals and tools".

Advanced materials and systems for smart electronics

Main topic of this session is to present and discuss advanced materials and material systems for smart electronics. The workshop focuses on novel material enabled solutions for a variety of new innovative applications ranging from sensor devices and flexible electronics to energy storage, photonics, high power electronics, wearable devices or smart systems. This includes nanoscale materials for novel devices, advanced materials for printable electronics and energy applications as well as simulation methods and analysis technologies for designing materials systems and optimizing material properties.
Sub-sessions will cover the topics “Advanced materials for smart electronics“ and “Advanced materials for energy efficient smart systems”.

Advanced processes, condition monitoring and process control

Main topic of this session is to present and discuss current trends in model-based condition monitoring, preventive maintenance and process control.
The focus lies on model-based and real-time process control in industrial production processes as well as on advances in hybrid modelling approaches combining a-priori domain knowledge and system observations (also known as grey-box modelling or physics-informed machine learning).

Computational multiscale materials design and materials accelerator platforms

Main topic of this session is to present and discuss leading-edge developments in computational multiscale materials design in connection with materials accelerator platforms (MAPs).
A common element of MAPs is the transition from stand-alone simulation or characterization tools towards integrated environments combining databases, physical modelling, inverse design, machine learning and experimental testing in a common framework. The scope of this symposium are the modelling approaches, the relevant interactions between simulations and experimental techniques as well as the overarching machine learning driven approaches for future materials design.

Digitalization and reliability of railway tracks

Main topic of this session is to present and discuss leading-edge developments in materials based approaches to condition monitoring and predictive maintenance of railway infrastructure, focusing on the track components (rails, crossings, ballasted & slab track, ...).
The topics include characterization and modelling of track components as well as methods for non-destructive testing of track components, different condition monitoring approaches (mobile setups versus wayside condition monitoring, active vs. passive methods including optimum sensor selection and placement), and modelling approaches towards predictive track maintenance.

Energy storage for e-mobility and stationary applications

Main topic of this session is to present and discuss leading-edge developments in material enabled energy storage solutions for the future. The focus lies on current trends in material research and analysis as well as fabrication and design of advanced energy storage concepts. The workshop covers fabrication, computed aided characterisation and simulation of structure-property relationship.
Furthermore, there will be a sub session called “Reliability of electronic based systems” dealing with green and climate-friendly based technologies.