

SUPSI

Institute of Mechanical Engineering and Materials Technology

The institute acts as a driver of technological innovation
in mechanical engineering and materials technology.



Our key strengths



Cross-sectorial know-how

We are committed to developing cross-fertilising ideas, exchanging methods and transferring knowledge from academia to industry.



Innovation by experience

We are experienced professionals ready to take new and unexplored paths with you.



Highly specialised researchers

Our researchers possess strong scientific backgrounds in their specific fields of expertise, enabling us to develop creative solutions.

5
main scientific
research areas

48+
employees

6
professors

50+
industrial partners in the
territory

2,9 mio
annual research budget

20+
Research projects running
each year

OHSAS 1800:2007
Occupational Health
and Safety Management
Certification

ISO 17025:2017
Accreditation for the
measurement of breathable
asbestos fibres in
accordance with VDI 3492

The Institute provides expertise in product and process innovation. It can develop new technical solutions in order to meet new market needs and improve product competitiveness.

Our operations are appreciated by Swiss and European initiatives for the promotion of technological innovation, providing us with access to grants for collaborative projects with partner companies.

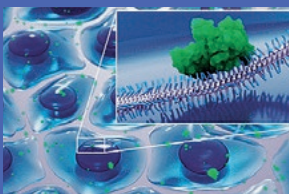
Scientific competences

Polymer Engineering



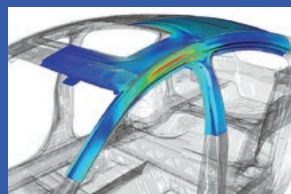
Research and training activities in the field of polymeric materials. Team competences include polymer science and technology, surface engineering, formulation engineering, all of which are also supported by modelling tools.

Computational Materials Science



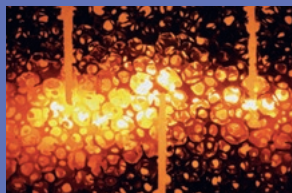
Computational physical chemistry, computational materials science, advanced molecular simulation methods, multiscale modelling and advanced analysis approaches for the study and characterisation of complex molecular systems.

Mechanical Engineering



Design of mechanical and mechatronic components and systems, additive and subtractive manufacturing, digitalisation of manufacturing processes for Digital Twins.

Hybrid Materials



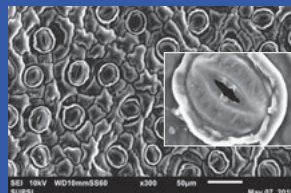
Ceramic and polymer matrix composite materials, ceramic foams and lattices. Study of material microstructures, their characterisation. Development of innovative additive manufacturing processes for ceramic components.

Thermo-fluid Dynamics



Renewable energy, energy storage, heat transfer, district heating, efficiency analysis of systems and processes, thermo-fluid dynamics simulation of complex single phase and multiphase flows.

Analysis and Material Characterisation



Structural and chemical analyses of various types, by virtue of the expertise and laboratory infrastructure available. Highly specialised service of scanning electron microscopy and EDX spectroscopy.

Transfer of competences



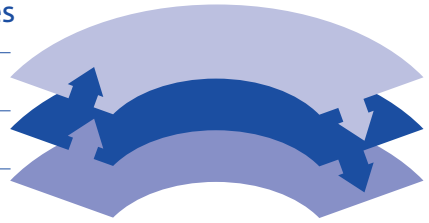
Research



Education



Innovation



«We are engineering hybrid materials for high-tech applications»

Our activities primarily include applied research and education in the science and technology of materials field. Research focusses on the development, characterisation and study of the relationships between production processes and the final characteristics of innovative materials of technological interest.

The main research work concerns the study of new additive manufacturing approaches for the production of ceramic objects with high geometric complexity, using several classes of 3D printing techniques.

«We apply Thermo-fluid Dynamics as a key technology for a sustainable energy revolution»

Our research group is active in a number of specific sectors such as solar receivers' design, thermal energy storage performance optimization, energy storage plants dynamics,

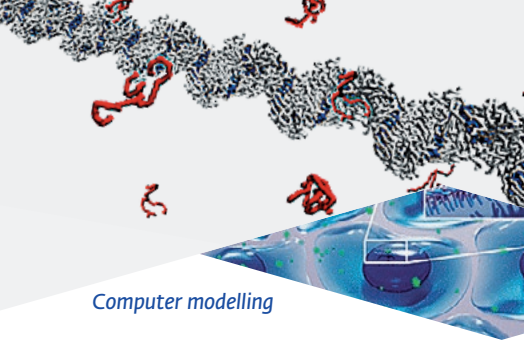
district heating systems simulation, multiphase-flows modelling. The team can count on more than 15 years of modelling and simulation experience and can offer robust and reliable experimental analyses. Our know-how and expertise can contribute to solve thermo-fluid dynamics and heat transfer problems and to improve efficiency and performance of systems in energy, pharmaceutical, biomedical and environmental industries.

«We use computer modelling to explore new routes toward next-generation materials»

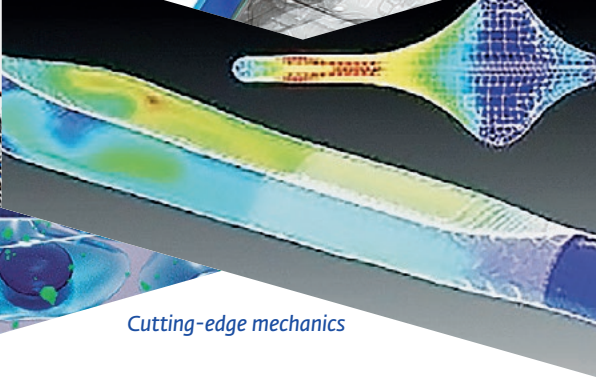
Nature is a source of technological inspiration, designing materials that possess unique dynamic, active and functional properties that are seemingly unattainable for our traditional, technological materials. The ability to design artificial materials with similar properties may

Hybrid materials





Computer modelling



Cutting-edge mechanics

pave the way toward next-generation materials for various applications. Our research group has developed specific know-how in terms of establishing how atomistic and molecular factors control the behaviour of complex molecular systems on different scales, and ultimately how this knowledge might be applied in the design of new types of functional materials.

«We understand mechanics as a cutting-edge discipline in the product design process»

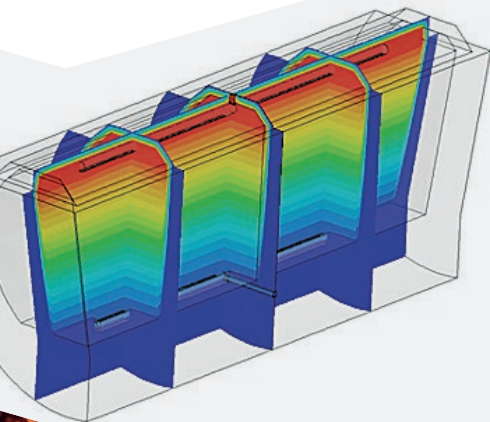
Our research work focuses mainly on the development of products, machines, and mechanical and mechatronic systems by identifying the optimal processes and selecting the materials required to build the components. By integrating the simulation of the entire production process in the design of a

component, it is possible to optimise its structural performance and predict its fatigue life. The design activities are supported by the static and dynamic experimental characterisation of the materials involved.

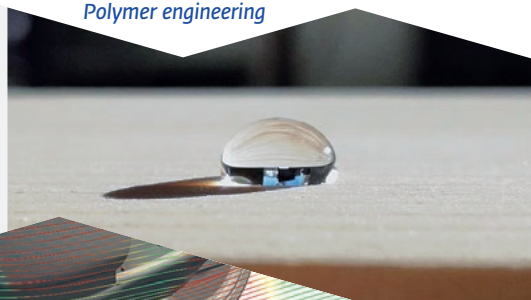
«Engineering new, custom-made polymers is our daily challenge»

Our research group works mainly in close collaboration with industrial partners, supporting their manufacturing and product innovation processes. Our research work encompasses: sustainable flame retardant polymers, high added-value recycled polymer compounds, (nano)-composites, bioresorbable polymers for biomedical applications and processes, functional nano-coatings.

Thermo-fluid Dynamics



Polymer engineering



Information

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How to reach us



More info

