



**NAME : SP MATERIALS RESEARCH CENTRE**

**INSTITUTION : SP TECHNICAL RESEARCH INSTITUTE OF SWEDEN**

**COUNTRY: SWEDEN**

**Profile :**

SP Technical Research Institute of Sweden is a national institute for technical testing, evaluation and quality assurance and related research and development of measurement and testing techniques. SP also carries out the national responsibility for metrology. The major activity is testing and research assignments and advisory services for Swedish government, industry and national and international authorities. SP has, due to its broad multi-disciplinary competence within eight technical departments, several daughter companies and associates within the Swedish academia and other research institutes, a unique potential for cooperative endeavours in novel and innovative areas. The total staff is 830 persons with more than a half with academic education and about 180 with a PhD degree.

The SP Materials Research Centre (SP MRC) brings together the broad expertise in Materials Science available at SP Technical Research Institute of Sweden. and its daughter companies YKI - the Institute for Surface Chemistry and SIK – the Swedish Institute for Food and Biotechnology.

SP MRC functions as advisor and coordinator of the national and international material research projects within the company and serves as a platform for consulting and discussions about development of the visions and competence within the field of material science.

**Activities :**

- Research and development in the field of materials science and its applications in industry; development of new analytical techniques for characterization of materials, durability and degradation of materials and coatings, etc. Initiation, promoting and coordination of material research on a multidisciplinary level, in order to improve existing and/or develop new materials and find new applications. Research and development in the form of open projects and confidential commissions are carried out.
- Service providing to the industry: testing and applied research, research infrastructure and research logistics. The service is mainly oriented towards the following industries: the forest products industry, materials and coatings industry, chemical and engineering industry and the pharmaceutical and food industry, automotive industry, and electronics industry.
- Education in the field of materials science: organisation of workshops, conferences, courses and thematic days, for participants from industry and research institutes with regard to modern developments in materials science and characterization methods. Educational activities at the Swedish universities and colleges as external teachers; supervising of master students and PhD students.

**Expertise on following materials :**

- Biomaterials
- Titanium
- Lipid assemblies (membranes, vesicles)
- Organic and inorganic coatings
- Metals
- Concrete
- Wood
- Rock materials
- Ceramics
- Mortar
- Ballast
- Adhesives
- Polymers
- Wood composites
- Polymer composites
- Dental composites
- Coatings
- Paints
- Plastics
- Rubbers/elastomers
- Renewable plastics
- Biocompatible materials and medical devices
- Thin films
- Solar cell materials
- Specialty coatings, i.e. easy-clean coatings and edible coatings
- Building materials
- Flooring materials

**Actual research domains concerning materials technology / Competences**

- **SP Department of Chemistry and Materials Technology**
- Chemical characterization of major as well as trace components in materials
- Emissions of organic compounds (volatile organic compounds, aldehydes, organic acids, etc.) from materials using a microchamber; even at various temperatures and atmospheres
- Chemical characterisation of aerosols
- Chemical characterisation of additives in polymers and residual monomers
- Migration of organic compounds to drinking water
- Characterization of biocompatible materials and medical devices
- Surface and interface characterization
- Characterization of thin films and coatings
- Imaging mass spectrometry of biosurfaces and interfaces
- EU project management and coordination

- Corrosion
- Service life prediction methodologies
- Characterization of specialty coatings, i.e. easy-clean coatings
- Evaluation of solar materials
- Accelerated aging in various atmospheres
- Physical and thermal properties
- Thermal analysis
- Mechanical strength
- Characterization methods: Spectroscopy UV/VIS, FTIR (also on surfaces), mass spectrometry, GC/MS, LC/MS, ICP/MS ToF-SIMS.

### **- SP Department of Building Technology and Mechanics**

- Wood preservation and wood modification
- Wood coatings and adhesives
- Wood/plastic composites
- Durability, mechanical testing and material physics of wood based materials
- Rock mechanical testing and characterization
- Optical 3D deformation analysis
- Mechanical testing of materials/components including durability/lifetime (spectrum loading, multi-axial loading, uni-axial loading)
- Microscopy
- Microstructural characterization
- Tribological studies
- Material modelling
- Finite element simulations
- Statistical analysis
- Measurement uncertainties
- Wood-based composites: Durability in field- and laboratory tests
- Wood-based composites: Natural and accelerated aging
- Wood-based composites: Micromorphology
- Wood-based composites: Surface and interface analysis (electron microscopy, surface spectroscopy)

### **- SP Department of Fire Technology**

- Thermal properties
- Ignition propensity
- Flame spread including modelling
- Fire growth
- Extinguishment of fires
- Toxic gases production

### **- SP Department of Electronics**

- Environmental testing
- Computational fluid dynamics simulation

- Finite element simulation
- Electroplated coatings
- Electric characterisation of materials

**- YKI Institute for Surface Chemistry**

- Development of mesoporous silica particles for controlled release and delivery
- Development of structured latexes
- Development of coating colours for paper coating
- Development of paint formulations
- Development of superhydrophobic paper
- Rapid formulation of new products
- Casting of ceramics
- Development of stable metal foams and antifoams for non-aqueous foams
- Development of coatings of spray-dried powders
- Functionalization of mesostructured materials
- Functionalization of surfaces by plasma
- Synthesis of new labile surfactants
- Impregnation of wood using micro-emulsion
- Development of edible materials for protection of food
- Development of anti-graffiti coatings
- Thin films
- Surface interactions (adsorption, adhesion, wetting, ...)

**- SIK Swedish Institute for Food and Biotechnology**

- Design of biomaterials
- Design and formulation of edible coatings
- Thermoforming of plastics and biomaterials
- Characterization of mechanical properties of biomaterials and plastics
- Characterization of barrier properties of biomaterials and plastics
- Characterization of thermal properties of biomaterials and plastics
- Characterization of microstructure of biomaterials
- Characterization of the interaction between packaging materials and foods
- Characterization of mass transport in biomaterials
- Microbial interaction with material surfaces
- Life Cycle Assessment of biomaterials
- Coordination and administration of European co-operation projects

**Available research infrastructure :**

- Extensive network towards Swedish university groups and industries
- State-of-the art laboratories with extensive instrumentation for chemical analyses and materials characterization
- Coordination of Swedish centre of excellence “Supermolecular biomaterials”
- Collaboration within Swedish centres of excellence in the field of biomaterials (BIOMATCELL) and pharmaceuticals (Co-Direct – Controlled delivery and release)



## European Network of Materials Research Centres

<p>and paints and coatings (Scandinavian Coatings Centre)</p> <ul style="list-style-type: none"><li>- Additional expertise through associated industrial research institutes on textiles and fibres</li><li>- Additional competence through associated universities in the field of X-ray diffraction (powders, single crystals, under various temperatures and atmospheres), transmission electron microscopy and micro- and nanofabrication</li><li>- State-of-the art computer tools for modelling and simulation</li></ul>		
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