

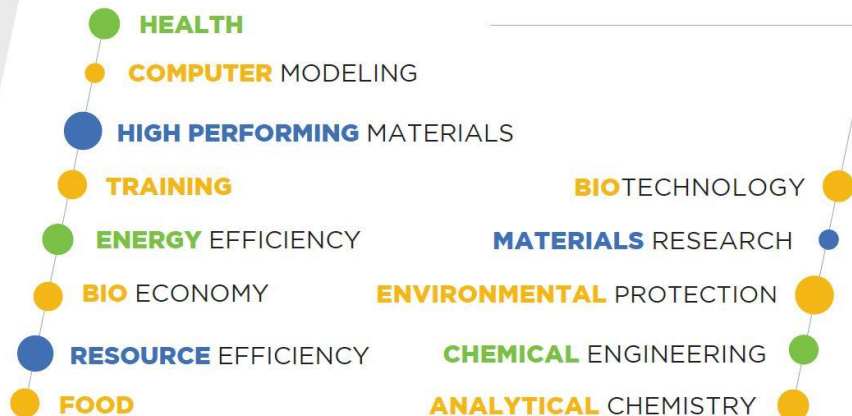
SusChem 2017 Brokerage Event

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Advanced and high performing polymers AND Chemical Engineering processes

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CHEMICAL TECHNOLOGY AND ENGINEERING

- the development and optimisation of chemical processes
- wastewater cleaning

CHEMICAL ANALYSIS

- inorganic materials and ionic species
- the chemical and biochemical analysis of water
- substances in food supplements
- the development, validation and analysis of active pharmaceutical ingredients and products according to the GMP standard
- the characterization of chemical structures with NMR

MATERIALS RESEARCH

- analysis and synthesis of polymeric materials
- the development of porous adsorbents and porous catalysts
- the development of heterogeneous catalysts
- the development of advanced batteries
- the development of coatings

BIOLOGICAL AND BIOCHEMICAL RESEARCH

- research of biological processes, biotechnology and biologics
- studies of biological macromolecules and biological activity
- determination of the structure of biomolecules

COMPUTER SIMULATIONS

- life sciences and bioinformatics
- chemometrics and statistical methods in chemistry, proteomics and genomics
- studies of the links between the structure and function of complex molecular systems

Emulsion templating of three dimensional synthetic polypeptide-based macroporous scaffolds

- Beyond state of the art in material engineering and polymer synthesis
- Biocompatible and biodegradable polypeptides with desired surface functionality
- Working packages: monomer synthesis, design of emulsion, scaffold purification, scaffold characterisation and testing
- Impact: TRL 5, novel, high performance scaffold generation

Call identifier: NMBP-21-2020: Custom made biological scaffolds for specific tissue regeneration and repair (RIA)

Characterisation: of various polymers with high level equipment, of artificial lipid droplets and lipid vesicles by asymmetrical flow field flow fractionation

Synthesis and production capacity: polymer nanocomposites with

- *in situ* polymerisation
- -solvent mixing or melt blending using twin –screw extruder (Haake Minilab, Dr. Collin ZK25T) with capacity from 6 gramms to 5 kg/hour.
- Injection moulding (Babyplast) for samples for mechanical and tribological measurements of polymer blends, composites and nanocomposites

Determination of thermal and thermomechanical properties for polymer composites and blends:

-dynamic mechanical analysis (DMA Q800)

Scanning calorimetry (DSC, Mettler Toledo DSC 1)

Other high level equipment: NMR, X ray diffractometer, Scanning electron microscope

- **Catalytic Carbon Dioxide Activation and Conversion by Hydrogenation or Alkylation**

chemical recycling of CO₂ to useful fuels, utilizing the parallel reactor system with heated gas sampling system (w/ recycle option), automation to enable computer control, data logging and automatic conduction of experiments, identifying the nature and role of each metal component in catalyst over CO₂ hydrogenation, emerging of low temperature reactions which can achieve a 100 % selectivity to methanol, so that it can reduce the consumption of energy on the reactor and reduce production costs, expanding and investigating the predominant reaction pathway to further mixed metal oxide catalysts

- **Direct Catalytic Methane Activation and Conversion to Aromatics and Alkenes**

methane utilization – one of the most important research targets in catalysis, methane-to-propylene and methane-to-aromatics processes, catalysts – CeO₂ nanocrystals, zeolites & others, development of novel catalytic routes

- **Catalytic Cellulose, Hemicellulose and Lignin Conversion to Value-added Bio-based Chemicals**

bio-refining & biotechnological process exploitation of different (LC/marine) biomasses, cellulose fraction conversion to sorbitol, adipic acid or levulinic acid, hemicellulose-derived furfural upgrade towards bio-monomers, micro-kinetic model development for lignin depolymerisation reactions, gas solubility studies in complex biomass-derived compounds using high-pressure view cell

- **Electrocatalytic Carbon Dioxide Activation and Reduction, Electrolysis and Fuel Cells**

- **Pharmaceutical Process Engineering and Design for Small Molecules and Biosimilars**

Call identifier: H2020-SPIRE-2018–2020, H2020-NMBP-2018–2020, H2020-BBI-2018–2020

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