

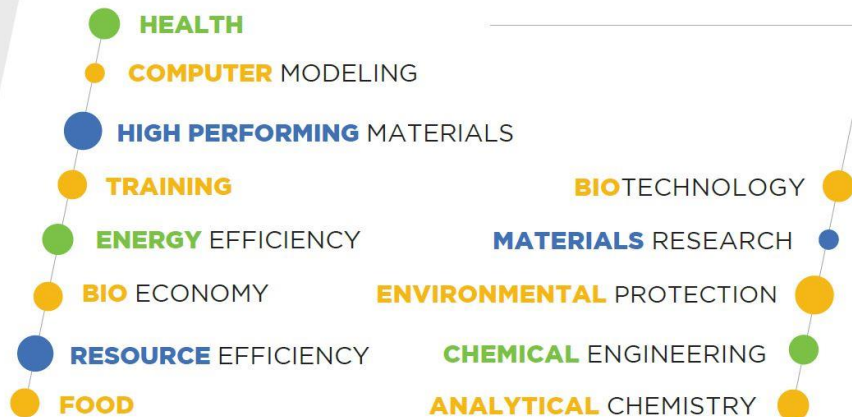
# Thematic brokerage workshops

EU Brokerage Event on Kets in Horizon 2020

Strasbourg, 17th October 2017



NATIONAL INSTITUTE OF CHEMISTRY



## 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

# Expertise offered: Material (polymer) science

**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



# Expertise offered: Chemical Engineering

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

chemical recycling of CO<sub>2</sub> 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 CO<sub>2</sub> 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 – CeO<sub>2</sub> 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**



# Expertise offered: Environmental Engineering

- **Environmental catalysis**

development of advanced processes for wastewater treatment, production of hydrogen rich gas mixtures and high added-value chemicals

- **Biohydrogen and biogas production**

development of new efficient ways to produce biohydrogen and biogas from industrial waste streams, waste sludge and renewables

- **Ecotoxicology**

aquatic toxicity of emerging contaminants and real environmental samples

- **Metrology in chemistry and biology**

development and validation of analytical methods for wastewater quality evaluation

- **Process engineering**



# CONTACTS

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