# **Department of Catalysis and Chemical Reaction Engineering**

# **Research topics**

- Research subfield: <u>Carbon dioxide activation</u>
- Research subfield: <u>Methane activation & conversion</u>
- Research subfield: <u>Hydrogen & fuel cells & electrocatal.</u>
- Research subfield: Pharmaceutical process engineering
- Research subfield: Biomass-derived building blocks



# **Ongoing projects**

## Horizon 2020:

- <u>MefCO2</u>, Synthesis of Methanol from Captured Carbon Dioxide Using Surplus Electricity (SPIRE-02-2014)
- <u>Fresme</u>, Methanol from CO2 Blast Furnace gasses to be used as ship transportation fuel
- <u>ADREM</u>, Adaptable Reactors for Resource- and Energy-Efficient Methane Valorisation (SPIRE-05-2015)
- <u>nextBioPharmDSP</u>, Next-generation Biopharmaceutical Downstream Process (BIOTEC-4-2014) ERA-NET:
- <u>Mar3Bio</u>, Biorefinery and Biotechnological Exploitation of Marine Biomasses (MarineBiotech Marine Biotechnology ERA-NET)
- <u>RHODOLIVE</u>, Biovalorization Of Olive Mill Wastewater To Microbial Lipids And Other Products

## NATO SPS:

• <u>984738</u>, Enhanced Portable Energetically Self-sustained Devices for Military Purposes (ESCD - Emerging Security Challenges Division); <u>coordinator</u>

## **COST Actions:** 3

Members of EERA – European Energy Research Alliance Slovenian Research Agency projects: 1 Bilateral cooperation projects: 2

## PARTNER PROFILE: LIGNOCELLULOSIC BIOMASS VALORIZATION

- **R&D** on a lab scale
- Kinetic modeling, parameter estimation and sensitivity analysis ٠
- Process simulation and optimization (CFD, DFT, Monte-Carlo, Aspen+) ٠
- **Downstream processing** ٠
- Scale-up (based on combined experimental and *in-silico* studies) .
- **R&D** on a pilot scale ٠
- **Unit operations**

#### **AVAILABLE RESEARCH INFRASTRUCTURE:**

#### High-throughput high-pressure reactor systems:

Various reactor configurations 5 x parallel continuous fixed-bed reactors (in-house fabricated) 6 x parallel fully-automatized stirred reactors (Amar)

#### Individual high-pressure reactor equipment:

- 1 x Fully automatized fixed bed or trickle bed reactor (PID Eng&Tech)
- 2 x 1700 mL stirred reactors (Parr, SS-316 and Titanium)
- 1 x 300 mL stirred reactor (Autoclave engineers)
- 1 x High-temperature gradient plate-catalyst reactor (in-house fabricated)
- 1 x Reactor equipped with a scale for thermogravimetric analysis (Rubotherm)
- 1 x RC1e calorimeter with *in-situ* FTIR and FBRM probes (Metler Toledo)
- 1 x Fully automatized view-cell with highly-precise T and P sensors (in-house fabr.)

### **Analytical equipment:**

 $3 \times \text{Two-module } \mu$ -GC (2 x Agilent, 1 x Inficon) 4 x GC-TCD (2 x SRI, 2 x Agilent) 2 x GC-MS/FID (1 x Agilent, 1 x Shimadzu) 1 x GC-FID (Thermo Scientific) 2 x HPLC/DAD (HP/Agilent, Thermo Scientific) 1 x UHPLC/DAD-RI (model known in May) 1 x FTIR with DRIFT, liquid-probe & gas-cell modules 1 x UV-VIS spectrophotometer (Perkin-Elmer)

#### **Glass apparatus:**

- 1 x Labmax (Metler Toledo)
- 1 x Ebuliometer (Fischer Sci)
- 2 x Pilot scale adsroption and destilation units

#### **Characterization equipment:**

- 1 x Physisorption analyzer (Micromeritics ASAP 2020)
- 1 x Chemisorption analyzer with MS (Mircromeritics AutoChem)
- 1 x Co-owners of scanning electron microscope (Carl Zeiss)





## **EXISTING EXPERIENCE: LIGNOCELLULOSIC BIOMASS VALORIZATION**



Forest Value Webinar | 15. November 2017

# PROJECT IDEAS OF INTEREST (among others): BIO-BASED ADIPIC ACID and PHENOLICS

