Ref. 2017/46: PEM electrolysis-assisted hydrogen production and hydrogenation reactions

Description of the project: The project involves development of innovative reactive environment (material and reactor) for water splitting by means of electrochemical heterogeneous catalysis, namely PEM electrolysis, and also employs the unique catalytic interfaces for efficient catalytic hydrogenation reactions such as CO2 conversion. Besides novel catalyst syntheses and process optimisation, development of spectroscopic tools to monitor catalyst and catalytic reactors under working electrochemical conditions is expected to facilitate rational catalyst design.

Preferred skills or background: Candidate should possess background in chemical engineering, chemistry, physics or material science with proven skills and/or convincing interests in synthesis and characterization of catalyst materials. Experience or strong interest in electrochemistry, heterogeneous catalysis, reaction engineering, spectroscopy and programming is highly valued.

Ref. 2017/47: New low cost materials for CO2 separation, and valorisation: from artificial photosynthesis to CO2 capture

Description of the project: Processing of metal oxides and metal-organic frameworks with CO2 selectivity for separation, electroreduction, and hydrogenation of carbon dioxide in ambient conditions. Processing and implementation in electrochemical devices, coupling these new materials and processes with water oxidation (electro) catalysts for the development of a complete and self-standing artificial photosynthetic process. The work will
combine chemical synthesis; chemical engineering; device design and construction; validation and establishment of optimum processes and materials

**Preferred skills or background:** A master degree in materials sciences, nanotechnology, inorganic chemistry, or similar. Experience in inorganic synthesis, physical characterization (magnetic, conducting, optical) will be welcome.

| Name of Supervisor: Prof. Anton Vidal |
| Nº of Projects: 1 |

**Ref. 2017/48:** Supramolecular approaches towards control of chemo- and stereo-selectivity in C-C bond forming reactions with CO-related reagents

**Description of the project:** A PhD position in supramolecularly regulated enantioselective catalysts for C-C bond forming reactions with CO-related reagents is available within the group of Prof. Anton Vidal ([http://www.iciq.org/research/research_group/prof-anton-vidal/](http://www.iciq.org/research/research_group/prof-anton-vidal/)).

The main aim of the present project is the design and preparation of novel, efficient and reliable catalytic asymmetric tools for the above mentioned transformations, which can be applied to the stereoselective synthesis of compounds with biological, pharmaceutical or agrochemical relevance. A modular design of the catalysts, the incorporation of a regulation site for the geometry of the active site, and the computational analysis of the catalytic event are key factors in our strategy.

**Preferred skills or background:** Applicants must possess a Master degree in Chemistry and a sound background in synthetic organic/inorganic chemistry. Candidates must also have excellent written and oral communication English skills.