

PhD Candidate Profile

Name:

Julia Garcia-Cardona

**Research Group (if relevant):**

Laboratory of Materials Electrochemistry and Environment (LEMMA)

Research Centre (if relevant):

Faculty of Chemistry

Department/School(s) (if relevant):

Department of Materials Science and Physical Chemistry

College:

Universitat de Barcelona, Barcelona

Supervisor(s):

Dr. Pere L. Cabot Julià

Dr. Ignacio Sirés Sadornil

Funding body:

MINECO

Area (field) of study:

Preparation of catalysts for energy and environmental applications

Thesis Title:

Synthesis and characterization of nanoparticulated supported catalysts for porous electrodes and environmental applications

Abstract:

Hydrogen is a clean energy vector that can be satisfactorily used in fuel cells, which have higher efficiency than other competing devices. The hydrogen synthesis has then a special interest, for example from water electrolysis, in which high purity H₂ can be obtained. Pt is the best catalyst for the hydrogen oxidation and the hydrogen evolution reactions. However, it is expensive, scarce and susceptible to poisoning.

One of the main objectives of this project is to synthesize and characterize core-shell nanoparticles containing a sacrificial metal as the core, Cu for example, coated with a Pt shell, dispersed on different supports, such as carbon blacks and mesoporous materials, in order to reduce the amount of Pt used and the CO poisoning. Application in fuel cells will be assessed. In addition, the core-shell nanostructures will be used for water treatment by means of electrochemical advanced oxidation processes, in which Pt can be used as the anode to contribute to the oxidation of organic pollutants.

PhD Candidate Profile

A step forward is also planned in the case of obtaining good anode catalysts for the oxidation of organic pollutants, since its combination with a gas-diffusion cathode would yield a fuel cell for water decontamination. Using a specialty electrode as gas-diffusion electrode for hydrogen peroxide generation, the addition of Fe^{2+} or purpose-made Fe-based heterogeneous catalysts to the solution in catalytic amounts could promote Fenton's reaction, thus enhancing the degradation of contaminants.

Collaborations:

N/A

Publications:

N/A

Presentations:

XL Meeting of the Specialized Group of Electrochemistry of the Royal Spanish Society of Chemistry and XX Iberian Meeting of Electrochemistry.

Huelva, Spain. 9 – 12 July **2019**.

VII Symposium on Hydrogen, Fuel Cells and Advanced Batteries, HYCELTEC 2019.

Barcelona, Spain. 1-3 July **2019**.

XXXVII Reunión Bienal de la RSEQ.

San Sebastián – Donostia, Spain. 26 – 30 May **2019**.

3rd Workshop of the Excellence Network on Environmental and Energy Applications of the Electrochemical Technology.

Toledo, Spain. 14 - 15 May **2019**.

25th Topical Meeting of the International Society of Electrochemistry.

Toledo, Spain. 12-15 May **2019**.

International Workshop on "Advanced Materials".

Duni, Bulgaria. 11 – 14 September **2018**.

Masterquímica XIV.

Barcelona, Spain. 15-17 May **2018**.