

PhD Candidate Profile

Name:

Lele Zhao

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 (Physical Chemistry section)

College:

Universitat de Barcelona, Barcelona

Supervisor(s):

Dr. Ignacio Sirés Sadornil

Funding body:

State Scholarship Fund, CSC, China

Area (field) of study:

Removal of pollutants from actual and simulated groundwater by Electrochemical Advanced Oxidation Processes

Thesis Title:

Metal-organic frameworks for advanced wastewater treatment at neutral pH by electro-Fenton process: Preparation of heterogeneous catalysts and enhancement of H₂O₂ production

Abstract:

MOFs are high order and porous crystalline structures synthesized from metal ion/clusters and multidentate organic ligands. They might allow overcoming some current technical limitations, showing good perspectives for industrial applications, in particular, for absorption, filtration and degradation of organics in water. Their appeal arises from the large porosity and chemical tunability, beneficial for adsorption, which adds to their particular catalytic nature as recently verified in MOF-catalyzed AOPs.

The aim of this work is to investigate on novel heterogeneous Fenton catalysts with high efficiency, stability and performance within a wide pH range under operation in electrochemical systems. Two main novel MOFs will be investigated in detail: (1) Fe-based magnetic MOFs, which will be synthesized and characterized, and then applied as suspended catalyst in electro-Fenton process at lab- and plant-scale; (2) photoactive MOFs, to be applied in UVA and solar photoelectro-Fenton process. In addition, the

PhD Candidate Profile

synthesis and characterization of the preparation of new gas-diffusion electrodes to produce H_2O_2 on site will also be addressed.

Collaborations:

Prof. Camille Petit

Barrer Centre, Department of Chemical Engineering, Imperial College London,
South Kensington Campus, London, SW7 2AZ, UK

Publications:

Zhao, L., Wang, S., Wang, Y., Li, Z. Thermal stability of anatase TiO_2 aerogels.
Surface and Interface Analysis, 49(3), **2017**, 173-176.

Zhao, L., Wang, S., Wang, Y. Study of texture and structure of TiO_2 aerogel prepared by ambient pressure drying and sol-gel method.
Industrial Catalysis, 1, **2015**, 19-25. (Chinese)

Zhao, L., Wang, S., Wang, Y. Preparation of $V_2O_5-WO_5/TiO_2$ catalysts and their performance for flue gas denitration.
Industrial Catalysis, 23(11), **2015**, 874-881. (Chinese)

Presentations:

The Eleventh National Conference on industrial catalysis technology and application annual meeting .

Heilongjiang, China. 19th-22nd July, **2014**.