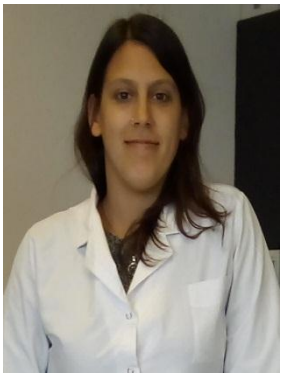
PhD Candidate Profile



Name:
Lucia Cancelada

Research Group (if relevant):
Environmental Remediation Chemistry Division

Research Centre (if relevant):
National Commission of Atomic Energy

Department/School(s) (if relevant):
Inorganic, Analytical and Physical Chemistry

College:
Buenos Aires University

Supervisor(s):
Dr. Marta I. Litter

Funding body:
ANPCyT (National Agency for Science and Technology Promotion)

Area (field) of study:
Environmental Chemistry

Thesis Title:
Special contaminants water treatment by iron based nanoparticles and combination with sonolysis (SonoFenton solid processes)

Abstract:
Nanomaterials for aqueous effluxes treatment is a dynamic research area. Particularly, zerovalent iron nanoparticles (FeNPs) and iron oxides nanoparticles (FeONPs) have proven to be very interesting materials for pollutant removal in water. This application is a novelty in Argentina and it has been scarcely researched. General operation mechanism for FeNPs is based in very efficient adsorption processes, in addition to co-precipitation and superficial redox reactions. FeNPs also participate in corrosion processes with ROS generation, which lead to oxidative Fenton-like reactions.

Sonolysis is a technology that uses high frequency sound waves (15 kHz – 1 MHz. In aqueous media, they promote the generation of powerful reactive species, capable of transforming contaminants without the need of other chemical reactants or light irradiation. Sonochemical irradiation of aqueous solutions produces cavitation gas bubbles that grow and collapse cyclically. Upon bubble implosion, very high local pressure and temperature are reached (4000 – 10000 K and 1000 – 10000 bar) and water molecules yield HO• and H• radicals. Transformation of contaminants occurs through supercritical water reactions,

direct pyrolysis and reactions with thermally generated radicals. Organic, and some inorganic, compounds are transformed through an oxidative path. The reductive mechanism, in oxygen-depleted systems, is useful for nitrate and metallic ions removal, through reaction with H•, reductive radicals (formed by previous reaction of added organic donors with HO• o H•), or radicals produced by pyrolysis in the interfacial region or the bubbles. Sonolysis and solid iron species combined – solid sonoFenton reaction – have synergic effects in pollutant removal.

Collaborations:

In 2018, I was invited to work as a guest research assistant in the Indoor Environment Group at Lawrence Berkeley National Laboratory (LBNL) in the United States of America. Under Dr. Hugo Destaillats´ supervision, I have been investigating on air treatment and pollutant removal with FeNPs.

Publications:

Jorge M. Meichtry, Mariel Slodowicz, Lucía Cancelada, Hugo Destaillats, Marta I. Litter, *Sonochemical reduction of Cr(VI) in air in the presence of organic additives: What are the involved mechanistic pathways?*, Ultrasonics Sonochemistry. 48: 110-117 (2018).

Presentations:

N/A