

PhD Candidate Profile

Name:

Ana María García Mora

Research Group (if relevant):

Grupo de Investigación en Remediación Ambiental y Biocatálisis (GIRAB)

Grupo de Investigación en Materiales Funcionales y Catálisis (GIMFC)

Research Centre (if relevant):

N/A

Department/School(s) (if relevant):

Departement of Chemistry

College:

University of Antioquia

Supervisor(s):

Dr. Ricardo Torres, Dr. Luis Alejandro Galeano

Funding body:

N/A

Area (field) of study:

Removal of natural organic matter by catalytic wet peroxide oxidation (CWPO)

Thesis Title:

Catalytic degradation of natural organic matter present in raw waters of Nariño Department through the Catalytic wet peroxide oxidation process

Abstract:

Worldwide reports showed recently a sustained increase in the color and natural organic matter (NOM) content in surface waters, with adverse effect on water treatability. Particularly in surface waters, during chlorine disinfection process, chlorine can react with natural organic matter to form disinfection by-products (DBPs), including trihalomethanes (THMs) and haloacetic acids (HAAs), some of the them well-known carcinogenic agents.

Several studies have been recently devoted to find out the potential role that advanced oxidation processes (AOPs) may play in the removal of NOM from natural waters. These AOPs rely primarily on the strong oxidation potential of hydroxyl radicals ($\text{HO}\bullet$; 2.8 V) able to deplete a wide range of organic substances, otherwise difficult to biodegrade. The AOPs studied in the NOM degradation have been: Ozone-based processes ($\text{O}_3/\text{H}_2\text{O}_2$ and O_3/UV); UV light applications ($\text{UV}/\text{H}_2\text{O}_2$, UV/O_3 , $\text{UV}/\text{chlorine}$, $\text{UV}/\text{persulfate}$); Fenton, photo-Fenton and Fenton-like processes; Heterogeneous photocatalysis (TiO_2/UV) and Ultrasound (5). Among



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all process, Catalytic Wet Peroxide Oxidation (CWPO) was proved to be an efficient method for the degradation of toxic and bio resistant pollutants. CWPO is a kind of heterogeneous Fenton-like AOP that use a solid catalyst able to generate the reactive radicals under ambient conditions of temperature and pressure, the use of appropriate catalysts can substantially decrease the energy consumption of oxidation processes of refractory organic compounds, also CWPO can work in a wider pH range than homogeneous Fenton which is important to take into account for drinking water applications, it is friendly environmental and inexpensive.

Collaborations:

N/A

Publications:

Ana M. García, Viviana Moreno, Sonia X. Delgado, Alfonso E. Ramírez, Luis A. Vargas, Miguel Á. Vicente, Antonio Gil, Luis A. Galeano. Encapsulation of SALEN- and SALHD-Mn(III) complexes in an Al-pillared clay for bicarbonate-assisted catalytic epoxidation of cyclohexene. *Journal of Molecular Catalysis A: Chemical* 416 (2016) 10–19.

A. Gil, Ana M. García, M. Fernández, M. A. Vicente, B. González-Rodríguez, V. Rives, S. A. Korili. Effect of dopants on the structure of titanium oxide used as a photocatalyst for the removal of emergent contaminants. *Journal of Industrial and Engineering Chemistry* (2017).

A. Gil, N. Taoufik, Ana M. García, S. A. Korili. Comparative removal of emerging contaminants from aqueous solution by adsorption on an activated carbon. *Environmental Technology* (2018).

Luis A. Galeano, Helir J. Muñoz, Ana M. García, Antonio Gil, Miguel Á. Vicente. Development of Mn or Fe sulfides in the interlayer space of raw and Al pillared bentonite. *Applied Clay Science* 157 (2018) 31–40.

Ana M. García, Ricardo Torres, Luis Alejandro Galeano, M.A. Vicente, A. Gil. Separation and Characterization of NOM Intermediates Along AOP Oxidation in *The Handbook of Environmental Chemistry*. Springer, Berlin, Heidelberg, 2018.

Presentations:

International Conference on Catalysis and Chemical Engineering. Catalytic degradation of Natural Organic Matter (NOM) by Advanced Oxidation Technologies. 22 – 24 February 2017, Columbia – Baltimore.

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X Simposio Colombiano de Catálisis. CWPO Degradation of Natural Organic Matter: Synthetic Water vs. Real Surface Water. 27 – 29 September 2017, Tunja – Boyacá.

3rd Iberoamerican Conference on Advanced Oxidation Technologies (III CIPOA) and 2nd Colombian Conference on Advanced Oxidation Processes (II CCPAOX). RMS optimization of natural organic matter degradation by Catalytic Wet Peroxide Oxidation. 14 – 17 November 2017, Medellín – Antioquia.