This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under Marie-Sklodowska Curie grant agreement No 101034285

UNIVERSITY: Public University of Navarre (UPNA)

WIT PROGRAMME´S RESEARCH LINE NAME:

Valorization of natural resources and waste

DOCTORAL PROGRAMME: Doctorate in Synthetic and Industrial Chemistry
https://www.unavarra.es/escuela-doctorado/doctorate-programs/current-plan/science/doctorate-in-synthetic-and-industrial-chemistry?languageId=1

COMPLETE DESCRIPTION OF THE LINE

Aluminum is a metal whose properties make it have a large number of applications. Both the process of obtaining and the recovery of the waste that is generated must be studied and optimized.

The overall objectives the research line, related to the valorization of natural resources and waste from the aluminium sector, are i) to achieve a systematic procedure that allows the recovery of critical raw materials (CRM, i.e. Co, Ga, Nd, In, Sc, Tb) from waste generated during the production of aluminium, both primary and secondary, developing new applications such as adsorbents, catalysts and ceramic materials; and ii) to reuse the waste, ultimately leading to a reduction in the use of natural bauxite as refractory bauxite. The production of aluminium from bauxite, primary aluminium, is a very costly process which is carried out in two stages and a waste, red mud, containing insoluble metal oxides (including CRM), is generated. In the case of the production of recycled aluminium, secondary aluminium, an important hazardous waste is generated, saline slag. The reduction of waste generated during the recycling of aluminium and the development of new materials that can be applied as adsorbents and catalysts in environmental and energy based processes (e.g., removal and photodegradation of emerging pollutants, CO_2 valorisation by dry reforming of

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CH_4 and CO_2 hydrogenation) are also objectives of the research line. The circularity of the chain of value will be ensured through the design of adsorbents, catalysts and ceramic materials.

RESEARCH GROUP NAME:

Environmental Technologies and Applications (TAMA)

COORDINATOR:

- Last and first name; link to the "Portal of scientific production": Gil, Antonio
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MEMBERS OF THE LINE RESEARCH:

Dr Antonio Gil, Full Professor. Chemical Engineering.

Dr Sophia A. Korili, Associate Professor, Chemical Engineering.

Dr Leticia Santamaría Arana, Post-doctoral researcher.

Dr Mª Iris Sancho Sanz, Post-doctoral researcher.

Jonathan Josué Torrez Herrera, PhD student (Public University of Navarra).

Yaneth Cardona Rodríguez, PhD student (Public University of Navarra, IberusTalent, European Union's H2020 MSCA-COFUND).

Wit Welcoming International Talent

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Helir Joseph Muñoz, PhD student (Public University of Navarra).

Iván Pedroarena Apezteguia, Researcher

Lucia Grande López, Researcher

ANOTHER RESEARCH LINES OF THE GROUP: list of them

Development of organo-inorganic hybrid materials with environmental applications as adsorbents and catalysts.

Development of new photocatalysts to obtain H_2O_2.

Advanced oxidation processes for urban wastewater treatment.

UV-visible photodegradation processes of emerging organic pollutants present in wastewater.

Capture, storage and recovery of CO_2 through methane reforming and reduction.

Separation and purification processes of liquid streams.

Development of ceramic filters with antibacterial applications.

- Entities involved in research lines and contact person:

✓ Academic entities:

* Grupo Sol-Gel, Universidade de Franca (Brasil): Prof. Katia J. Ciuffi.
* Boreskov Institute of Catalysis (Rusia): Dra. Maria N. Timofeeva.
* Grupo Materiales Funcionales y Catálisis, Universidad de Nariño (Colombia): Dr. Luis A. Galeano.
* Institute of Condensed Matter and Nanosciences. Université Catholique de Louvain (Bélgica): Prof. Eric Gaigneaux.
* Université Hassan II de Mohammedia (Marruecos). Prof. A. Elmchaouri.

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* Université Ferhat Abbas (Argelia). Prof. M. Boutahala.
* University of Limerick (Irlanda). Dr Teresa Curtin.
* Fasa University (Iran). Dr M.J. Amiri.
* Universidad Nacional Pedro Ruiz Gallo (Peru). Dr. S. Huangal.

✓ Industrial entities:

* IDALSA, S.L. Fernando Lou
* Micromeritics Instrument Corporation (EE.UU.). Dr S. Yunes

- Joint supervision of doctoral thesis with international universities or non academic institutions:

1. *Contribución al estudio de la modificación de las propiedades texturales de una saponita pilarizada con Al_{13} como soporte de catalizadores de Pt y Pt-Ce*. Mario Barrera Vargas (Colombia). 11/12/2006. Universidad Nacional de Colombia (Colombia). Co-dirección.
2. *Peroxidación catalítica de contaminantes orgánicos en medio acuoso utilizando una bentonita modificada con Al y Fe, Cu o Mn*. Luis Alejandro Galeano (Colombia). 21/12/2011. Universidad de Salamanca. Co-dirección.
3. *Implementación de metodologías de producción más limpia en el área de Salcajá, Cuenca alta del río Samalá, en el occidente de Guatemala*. Eddie Omar Flores Aceituno (Guatemala). 15/06/2012. Universidad Pública de Navarra. Co-dirección.
4. *Eliminación y valorización de CO_2 presente en efluentes gaseosos mediante adsorción y reformado seco de metano*. Siby Inés Garcés Polo (Colombia). 03/02/2016. Universidad Pública de Navarra. Co-dirección.
5. *Separación electrostática de una emulsión de glicerina en biodiesel con aplicación de diferentes voltajes y distancias entre electrodos*. Sebastián Huangal Scheineder (Peru). 17/01/2019. Universidad Nacional Pedro Ruíz Gallo (Perú). Co-dirección.

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6. *Elaboration de matériaux par imprégnation de charbon actif par le dioxyde de titane en utilisant la méthode sol-gel. Application à l'élimination des polluants organiques émergents et inorganiques en milieux aqueux*. Nawal Taoufik (Marruecos). 13/12/2019. Université Hassan II de Casablanca. Co-dirección. Co-tutela.
7. Hexaaluminates based catalysts from aluminum saline slags applied in the dry reforming of methane. Jonathan Josué Torrez Herrera (Nicaragua). En realización. Universidad Pública de Navarra. Co-dirección.
8. Control of antibiotics and drugs in Surface waters through adsorption and photocatalytic processes. Yaneth Cardona Rodríguez (Colombia). En realización. Universidad Pública de Navarra. Co-dirección. Iberus-Talent.
9. *Valorización química de CO_2 mediante hidrogenación para la obtención de metanol y productos derivados*. Helir Joseph Muñoz Alvear (Colombia). En realización. Universidad Pública de Navarra. Co-dirección.
10. *Etude des propriétés physicochimiques des matériaux composites: Elaboration, caractérisation pour des applications dans la dépollution par adsorption et de stockage d'énergie. Etude thermodynamique et texturale*. Soufiane El Mahmoudi (Marruecos). Universidad Pública de Navarra/Universitré Hassan II de Mohammedia (Marruecos). Co-tutela académica. Co-dirección. En realización.
11. *Synthèses et caractérisations des matériaux composites magnètiques/structure lamellaires encapsulés par des biopolymères. Investigation théorique et expérimentale*. Imene Kecir (Argelia). Universidad Pública de Navarra-Université Ferhat Abbas Sétif 1 (Argelia). Co-dirección. En realización.

- Brief group overview

The research group of Environmental Technologies and Applications (TAMA) of the Public University of Navarre works on research lines dealing with porous and surface properties of solids; pillared clays; gas adsorption; energy storage; pollutants adsorption and removal by photodegradation;

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preparation, characterization and catalytic performance of metal supported nanocatalysts. Research is related to industrial waste management and valorization for environmental technologies and management.

Research interests of the group: Porous and surface properties of solids; Clays; Gas adsorption; Energy storage; Pollutants adsorption; Environmental technologies; Environmental management; Preparation, characterization and catalytic activity of metal supported nanocatalysts. Industrial waste management and valorization.

ACADEMIC REQUIREMENTS: Chemistry, Engineering

Additional requirements: basic knowledge of Spanish. English and/or French