

## Dr. ALFREDO ORTIZ

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### RESEARCH TOPICS

My research interests focus on membrane separation technologies, in the group Advanced Separation Processes led by Prof. Inmaculada Ortiz. I mainly work on the separation of gas mixtures by reactive absorption using Room Temperature Ionic Liquids as reactive solvents in different contactors.

### DESCRIPTION

Light olefins such as ethylene and propylene are important chemical precursors that play an essential role in many chemical syntheses and industrial processes. Common low-temperature distillation technology for separation of olefins from paraffin streams represents one of the most important, but also the most costly, processes in the petrochemical industry. Development of economically viable propylene/propane separation processes is becoming increasingly important, but it is extremely challenging due to the physico-chemical similarities between those two molecules. Among a number of alternatives separation processes, reactive absorption process carried out in a suitable gas-liquid contactor with the selective formation of reversible complexes olefin-silver in room temperature ionic liquid media may be attractive in this respect.

### PROJECTS

#### European Projects:

"The application of green technologies for sustainable water purification and reuse"

#### National Projects:

"Diseño y caracterización de nanomaterials magnéticos como agentes de separación"  
– SODERCAN S.A.

"Nuevos procesos de separación con control cinético basados en la utilización de materiales funcionalizados (CTQ2012-31639).

"Research and Development of Reactive Separations. Contribution to Sustainable Technological Development (CTQ2008-00690/PPQ)".

"Sostenibilidad de la producción: Intensificación e integración de procesos en la industria química y transformadora (CTM2006-00317)

## PUBLICATIONS

R. Zarca, A. Ortiz, D. Gorri, I. Ortiz. 2016. Facilitated transport of propylene through composite polymer-ionic liquid membranes. Mass transfer analysis. *Chemical Product and Process Modeling* 11 (1), 77-81.

M. Díaz, A. Ortiz, M. Isik, D. Mecerreyes, I. Ortiz. 2015. Highly conductive electrolytes based on poly([HSO<sub>3</sub>-BVIm][TfO])/[HSO<sub>3</sub>-BMIm][TfO] mixtures for fuel cell applications. *International Journal of Hydrogen Energy* 40 (34), 11294-11302.

M. Díaz, A. Ortiz, I. Ortiz. 2014. Progress in the use of ionic liquids as electrolyte membranes in fuel cells. *Journal of Membrane Science* 469, 379-396.

Z. Wojnarowska, J. Knapik, M. Díaz, A. Ortiz, I. Ortiz, M. Palluch. 2014. Conductivity mechanism in polymerized imidazolium-based protic ionic liquid [HSO<sub>3</sub>-BVIm][OTf]: Dielectric relaxation studies. *Macromolecules* 47(12), 4056-4065.

M. Díaz, A. Ortiz, M. Vilas, E. Tojo, I. Ortiz. 2014. Performance of PEMFC with new polyvinyl-ionic liquids based membranes as electrolytes. *International Journal of Hydrogen Energy* 39(8), 3970-3977.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2013. Polymer-ionic liquid composite membranes for propane/propylene separation by facilitated transport. *Journal of Membrane Science* 444, 164-172.

D. G. Sánchez, A. Ortiz, K. A. Friedrich. 2013. Oscillation of PEFC under low cathode humidification: Effect of gravitation and bipolar plate design. *Journal of the electrochemical society* 160 (6), F636 – F644.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2013. Propylene and propane solubility in imidazolium, pyridinium, and tetralkylammonium based ionic liquids containing a silver salt. *Journal of Chemical and Engineering Data* 58 (8), 2147-2153.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2013. Using membrane reactive absorption modeling to predict optimum process conditions in the separation of propane-propylene mixtures. *Industrial & Engineering Chemistry Research* 52 (26), 8843-8855.

M. Fallanza, M. González-Miquel, E. Ruiz, J. Palomar, A. Ortiz. 2013. Screening of RTILs for propane/propylene separation using COSMOS-RS methodology. *Chemical Engineering Journal* 220, 284-293.

D. G. Sánchez, A. Ortiz, Friedrich. 2013. Oscillation of PEFC under low cathode humidification: Effect of gravitation and bipolar plate design. *ECS Transactions* 58 (1), 209-221.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2012. Comparison of reactive membranes containing ILs in the separation of gaseous olefin-paraffin mixtures. *Procedia Engineering* 44, 326-327.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2012. Experimental study of the separation of propane/propylene mixtures by supported ionic liquid membranes containing Ag<sup>+</sup>-RTILs as carrier. *Separation and Purification Technology* 97, 83-89.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2011. Document improving the mass transfer rate in G-L membrane contactors with ionic liquids as absorption medium. Recovery of propylene. *Journal of Membrane Science* 385-386 (1), 217-225.

M. Fallanza, A. Ortiz, D. Gorri, I. Ortiz. 2011. Effect of liquid flow on the separation of propylene/propane mixtures with a gas/liquid membrane contactor using Ag<sup>+</sup>-RTIL solutions. *Desalination and Water Treatment* 27 (1-3), 123-129.

A.Ortiz, M. Fallanza, D. Gorri, I. Ortiz. 2010. Comparison of gas/liquid stirred tank and membrane contactors for the separation processes of propylene/propane mixtures using Ag<sup>+</sup> RTIL solution. 19th International Congress of Chemical and Process Engineering, CHISA 2010 and 7th European Congress of Chemical Engineering, ECCE-7.

A.Ortiz, D. Gorri, A. Irabien, I. Ortiz. 2010. Separation of propylene/propane mixtures using Ag<sup>+</sup>-RTIL solutions. Evaluation and comparison of the performance of gas-liquid contactors. *Journal of Membrane Science* 360 (1-2), 130-141.

A.Ortiz, L.M. Galán-Sánchez, D. Gorri, A.B. de Haan, I. Ortiz. 2010. Reactive ionic liquid media for the separation of propylene/propane gaseous mixtures. *Industrial and Engineering Chemistry Research* 49 (16), 7227-7233.

A.Ortiz, L.M. Galán, D. Gorri, A.B. de Haan, I. Ortiz. 2010. Kinetics of reactive absorption of propylene in RTIL-Ag<sup>+</sup> media. *Separation and Purification Technology* 73 (2), 106 – 113.

D. Gorri, A. Ruiz, A. Ortiz, I. Ortiz. 2010. The use of ionic liquids as efficient extraction medium in the reactive separation of cycloolefins from cyclohexane. *Chemical Engineering Journal* 154 (1-3), 241-245.

## **OTHER RESULTS**

PhD. Supervisor

New membranes for polymeric fuel cells (PEMFC) using ionic liquids as electrolytes. PhD. Student: Mariana Díaz Vejo. Universit of Cantabria.