



Area of Impact: Materials for New Technologies

Specialty: Materials for New Technologies

Table salt or sodium chloride is a chemical compound that consists of two elements or ions, negatively charged chlorine (anion), and the positively charged sodium (a cation). This salt is solid at standard temperature and pressure. However, there are various salts formed by different ions found in a liquid state. Such salts so-called "ionic liquids" serve to dissolve various compounds and, consequently, generate various chemical reactions. The infinite number of ionic liquids that can be synthesized enables the optimization of: performance, speed, energy efficiency and waste reduction of chemical reactions.

With a diverse and widespread work team composed of students, junior and senior researchers, the Millennium Nucleus Interdisciplinary Center of ionic liquids, CILIS, is meant to be a reference at the national and international level regarding the study of ionic liquids and in general, the development of green chemistry. The frontline research that is carried out at the Millennium Nucleus Center CILIS, that moves in a complementary way between the areas of theoretical chemistry, kinetics and organic synthesis, has allowed the growth of applied studies in fields such as electrochemistry and chemical engineering. In that sense, the investigation generated at CILIS has created advances in: drugs recycling, energy efficiency and reduction of toxic waste, all areas that will have a major impact on the future development of the country.



- First database of transfer-free energies from liquid to ionic liquids (IL) phases. Relevant for extracting contaminants, metal ions and resolution of drugs and hormones. Available at the CILIS website and the American Chemical Society: http://pubs.acs.org/doi/suppl/10.1021/jp304365v/suppl_file/jp304365v_si_001.pdf
- Development of devices for recovering CO₂ and its conversion into urethanes (fertilizers); degradation of organo-toxic phosphates; separation of biofuels using crops of ABE fermentation and techniques of pervaporation based on liquid membranes IL.
- Creation of 3 innovative models for the rationalization of the interaction of various substrates with IL, based on models of Lewis acidity and basicity, using quantum-mechanical methods based on electron density and two others based on classical simulations and ab initio.
- Development of new electro-synthesis techniques for restructuring greenhouse effect gases using modified electrodes based on IL designed and prepared in our laboratories as IL for specific tasks.

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RESEARCHERS

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RESEARCH TOPICS

- Organic Synthesis.
- Chemical Theory.
- Electrochemistry.
- Chemical Engineering.
- Kinetics and Mechanisms.

NOTED OUTREACH ACTIVITIES

- Training for teachers from the perspective of Green Chemistry as a way to teach Chemistry.
- Applications of Chemistry Workshop for food sustainability.
- Training of Young Researchers and Journalists in C & T projects with a focus on social impact. (2016)

 **PRODUCTIVITY PUBLICATIONS
(BETWEEN 2011-2017)**
ISI: 78

 **ACTIVE MILLENNIUM NUCLEUS CENTER
From 2011 to 2017**
The Millennium Nucleus Centers can be renewed after 3 years, reaching a maximum of 6 years.

 **PRESENCE
METROPOLITANA REGION**



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