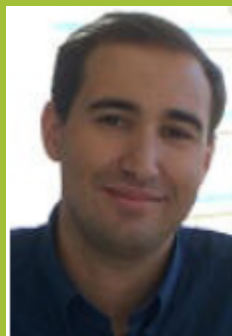


Chemistry Department

Task-Specific Ionic Liquids

Photochemistry and Supramolecular Chemistry Group



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Objectives

The discovery of novel and efficient smart and pharmaceutical functional materials as fluids (or gels) at room temperature that can combine one or more properties is one of the major challenges in the industrial and research modern applications. Ionic Liquids (ILs) as functional materials based on the dissolution of task-specific molecules (organic, inorganic or polymeric materials) or incorporating these molecules as cation or anion units have been reported in last years. For many applications, it's possible to combine the peculiar properties of ILs (high chemical and thermal stability, high ionic conductivity and very low vapor pressure) with the intrinsically properties of the selected molecules (as counter-ions) such as photochromic, electrochromic, magnetic, luminescent materials and active pharmaceutical drugs.

Methodology

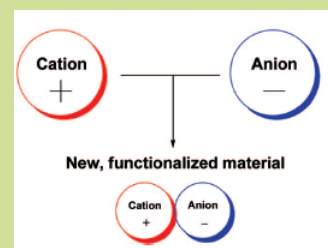
Intrinsically Photo- and Electrochromic based ILs were prepared by the combination of organic photochromic anions (e.g. methyl orange or methyl red derivatives) or metal complexes anions (e.g. EDTA metal complexes, vanadium or tungstenium oxides or ruthenium complexes) with appropriate organic cations. In the case of Electrochromic ILs is also possible to achieve the redox color switch using organic electrochromic cations based on viologen derivatives. Magnetic and Luminescent ILs have been also developed based on different paramagnetic ions (e.g. transition metals and lanthanides). Active Pharmaceutical drugs (APIs) based on anti-inflammatory (ibuprofen, naproxen), antibiotics (penicillin and fluoroquinolone derivatives) or neurological (anti-epileptic derivatives) compounds have been tested in combination with biocompatible cations or anions.

Expected Results

Smart Materials based on ILs will be used in a variety of applications, in particular: (1) most promissory chromogenic ILs will be incorporated into functional devices in order to create novel stable, reversible and smart functional materials. Optical memories and sunglasses (photochromic ILs); smart windows or efficient display devices (electrochromic ILs) are examples of expected potential applications; (2) Magnetic and Luminescent ILs can be used as innovative materials for selective separation processes and contrast agents for medical diagnostic.

Active Pharmaceutical drugs as Ionic Liquids (API-ILs) based on anti-inflammatory and antibiotic drugs showed an effective improve of bioavailability and stability compared with original solid APIs. Preliminary studies with valproate (anti-epileptic) and ampicillin ILs (antibiotic) suggested remarkable activities.

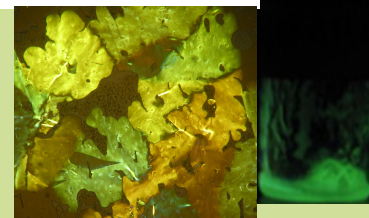
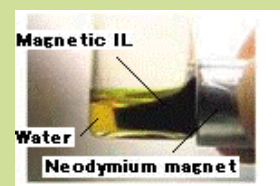
TASK-SPECIFIC ILs



Electrochromic ILs



Magnetic and Luminescent ILs



Pharmaceuticals ILs

