

Chemistry Department

Characterization of Ion Jelly films



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Throughout my PhD, I had the opportunity to deepen my knowledge in distinct areas, and learn to work with techniques such as DRS and DSC.

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Objectives

Ion Jelly is a polymeric conducting material obtained by cross-linking gelatin with an ionic liquid. It combines the chemical versatility of an ionic liquid with the morphological versatility of a biopolymer, which makes it suitable for different applications that go from energy storage and production to controlled drug release.

This work aims at characterizing Ion Jelly materials that can be used as solid electrolytes, and at testing the use of such materials in selected applications.

Methodology

Using a number of techniques, such as dielectric relaxation spectroscopy (DRS) in the frequency range 101–106 Hz, differential scanning calorimetry (DSC) and pulsed field gradient nuclear magnetic resonance (PFG NMR) spectroscopy.

Measuring the effect of different ionic liquid anion/cation combinations, ionic liquid content and water content, on the properties of Ion Jelly materials.

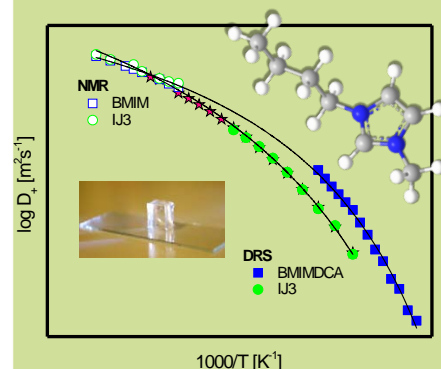
Expected Results

From dielectric data, extract information on the transport properties of Ion Jelly materials, and see how/if the diffusion and mobility of ionic species are affected by the presence of gelatin.

See how water affects the mobility and diffusion coefficients of the ionic liquid anion and cation.

Using Ion Jelly thin films, an electronic nose was set up, which was able to distinguish between eight organic solvents, including solvents as similar as ethanol and methanol (last figure). This confirms the potential of applying Ion Jelly technology in gas sensors.

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Ionic
Liquid

Gelatin

Ion
Jelly

