

POLYMERIC MEMBRANES BASED ON POLYMERIZABLE FLUORESCENT IMIDAZOLIUM IONIC LIQUIDS FOR A RAPID Fe^{3+} DETECTION IN AQUEOUS MEDIUM

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Nowadays, the detection and quantification of transition metal cations is an issue of major importance. When it comes to cation Fe^{3+} , this is one of the elements essential for life, and plays a primary role in many fields such as medicine, biology, environment, etc. Therefore, the development of new fluorescent chemosensors, which are cheap, rapid, and reliable, is currently attracting much attention to obtain polymeric sensors with high selectivity and sensitivity, easy operation, low-toxicity, stability, rapid analysis, and cost-effectiveness. Ionic liquids (ILs) are remarkable chemical compounds, with highly tunable nature and exceptional properties. Particularly, imidazolium based ILs with symmetrical plane conjugating structure exhibit high fluorescence emission induced by the imidazolium moiety and can be quenched by the coordinating interaction between the iron atom and the cationic imidazolium moiety [1].

In this work, [2] the use of polymeric solid membranes containing imidazolium ionic liquids is presented as an engaging strategy to develop materials capable of acting as sensors against the presence of Fe^{3+} . In this way, polymerizable imidazolium-based ionic liquids have been synthesized by varying the anion nature (Br^- , BF_4^- , PF_6^- and TFSI^-). Later, ILs were copolymerized with commercial monomers (N-vinylpyrrolidone (VP), butyl acrylate (BA) and a crosslinking agent) to control their hydrophilic character and getting crosslinked solid membranes (100 μm of thickness) for Fe^{3+} detection in aqueous solution. The membranes are solid, thermally stable and easily handled to be applied as sensor materials, Figure 1. In all cases, their fluorescence was totally quenched in presence of Fe^{3+} , and the limit of detection values was around 10^{-8} . Also, the membranes showed a reversible behavior and were highly selective as Fe^{3+} sensors respect to other metal ions, which is an important feature for further fabrication of an economical on-site tool for the detection of Fe^{3+} in aqueous environments.

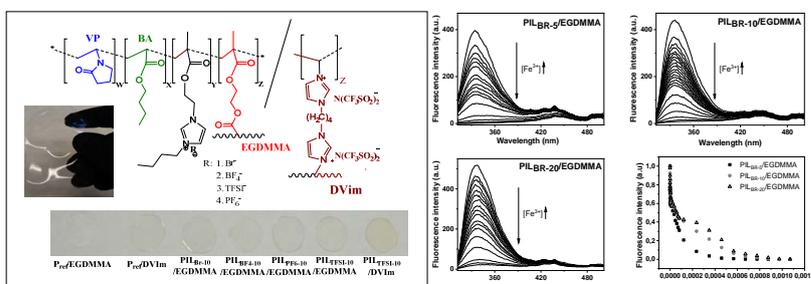


Figure 1. Left: Structure of membranes and Pictures showing their transparency and manageability. Right: Fluorescence spectra of PILBR-5/EGDMA, PILBR-10/EGDMA and PILBR-20/EGDMA in water in presence of increasing concentration of Fe^{3+} .

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[1] Chen, X. Liu, J., Wang, J. (2011). J. Phys. Chem. B 115, 1524–1530.

[2] Pablos, J.L., Catalina, F., Ibeas, S., Corrales, T. (2021) J. Photochem. Photobiol. A. 406, 113015.