

Ionic-liquid doped polymer membranes as systems for dyes removal from wastewater

Luigi Cino, Salvatore Marullo, and Francesca D'Anna¹

¹ Dipartimento STEBICEF, Università degli Studi di Palermo, viale delle Scienze ed. 17, 90128 Palermo, Italy

Water pollution by emerging contaminants such as dyes, pesticides, and pharmaceuticals is a pressing global environmental challenge. Dyes pose a serious threat to humans and to the ecosystem due to their accumulation in water sources which can lead to chronic health problems and endanger aquatic life. It is therefore crucial to properly remove them from water. In this context, this study focuses on the preparation of polymeric membranes doped with non-conventional solvents like ionic liquids (ILs), with the aim of effectively removing dyes from wastewater.^[1] The membranes were prepared using a biodegradable polymer such as poly(3-hydroxybutyrate), (PHB), and hydrophobic ILs (Fig. 1).

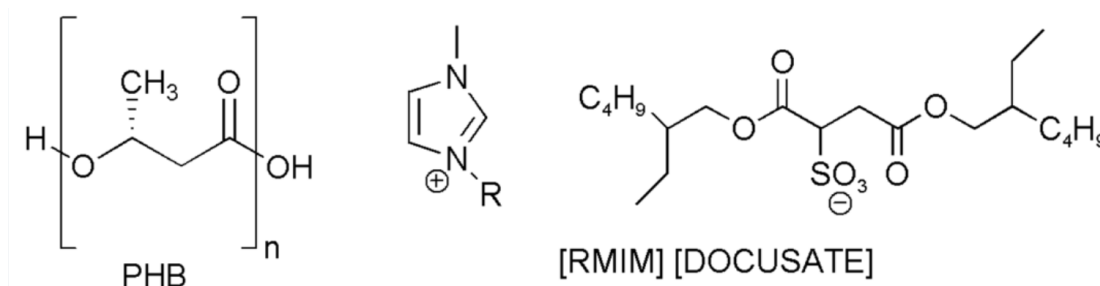


Figure 1. R=C₈H₁₇ [OMIM] [DOCUSATE] ; R=C₁₀H₂₁ [DMIM] [DOCUSATE]

The morphology of the membrane surfaces was characterized by SEM. Furthermore, we determined contact angle and surface rugosity. These membranes were used as sorbents for both cationic and anionic dyes, also in mixtures. We studied the effect of various parameters such as the initial concentration of dyes, sorbent dosage, contact time, pH, ionic strength, swelling and temperature.^[2] The results obtained demonstrated a high removal efficiency for various dyes, with values mostly higher than 90%. The recyclability of the membranes and the adsorption isotherms were also studied.

Acknowledgement: We thank MUR for funding, SiciliAn MicronanOTech Research And Innovation Center "SAMOTHRACE" (MUR, PNRR-M4C2, ECS_00000022), spoke 3 - Università degli Studi di Palermo "S2-COMMs - Micro and Nanotechnologies for Smart & Sustainable Communities". The funding source had no role in analysis, design, interpretation of results and report writing.

References:

- [1] S.-Q. Cong, B. Wang, H. Wang, Q.-C. Zheng, Q.-R. Yang, R.-T. Yang, Q.-L. Li, W.-S. Wang, X.-J. Cui, F.-X. Luo, *Int J Biol Macromol* **2024**, *256*, 128233.
- [2] Saif-ur-Rehman, M. Shozab Mehdi, M. Fakhar-e-Alam, M. Asif, J. Rehman, R. A. Alshgari, M. Jamal, S. Uz Zaman, M. Umar, S. Rafiq, N. Muhammad, J. bin Fawad, S. A. Shafiee, *Molecules* **2023**, *28*, 7162.