

# **Recent developments in ion-exchange membranes and their applications in electrochemical processes for in situ ion substitutions, separation and water splitting**

## **ABSTRACT**

Membrane-based separation processes are achieving a remarkable attention both in academics and industrial research due to the versatility and economic considerations. Ongoing challenges in water and wastewater treatment, food and biotechnology industries accelerating applications of electro-membrane processes. Intensified research on ion-exchange membranes (IEMs) based electro-membrane processes has been accomplished during recent years to produce potable water and downstream processes for biomolecules separation and recovery. The choice of proper membrane, design and operational optimization of the process are highly essential for successful commercialization of any process. Thus, the development of cost effective membranes by eco-friendly route is highly required for researchers working in the field of membrane development by electro-membrane-based processes. This review provides a brief summary of different preparative procedures for IEMs, transport phenomenon and their applications in electro-membrane separation processes. The most relevant studies have been discussed.

**Keyword:** Ion-exchange membranes; Transport phenomenon; Electro-membrane processes; In situ ion substitution; Separation; Water splitting