

## **Graphene oxide membranes for energy harvesting and lithium recovery**

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Graphene oxide (GO) has shown great potential as a membrane material due to its unique properties, including high mechanical strength, excellent thermal stability, versatility and tunability. GO membranes can be used in a wide range of applications, such as water treatment, gas separation, and biological applications.

GO membranes have been proved to be ion-selective thanks to their oxidized functional groups, which are naturally present on its surface and allow for easy functionalization and tunability of the properties. This ion selectivity, together with good mechanical strength, low cost, and simple synthesis, makes GO a great alternative material to conventional costly polymers for the production of ion-exchange membranes for reverse electrodialysis application. Results showed that GO membranes present good ion selectivity and size exclusion towards monovalent cations, reaching a permselectivity of up to 96% and an ionic resistance of only  $2 \Omega \text{ cm}^2$ .

Moving from energy harvesting to the energy field, GO membranes are good candidates for lithium recovery from brine and seawater. Lithium recovery by means of ion sieves or supramolecular chemistry has been extensively studied in recent years as a viable alternative approach to the most common extraction processes. GO membranes functionalized with a crown ether specifically designed for lithium recovery proved to be very selective towards lithium ions, also in presence of abundant competing ions like sodium and potassium.