

5 - 28 Construction of Bifunctional Vertical Nanochannels in GOM with Swift Heavy Ion Irradiation for Enhancing the Stability and Nanofiltration Performance

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Separation and purification technology is becoming increasingly important, especially with the rapid industrial development, which brings huge demands in energy and environment^[1,2]. Nanofiltration (NF) membrane technology is gaining more attention on the scale of ion separation and purification^[3,4], particularly, graphene oxide (GO) nanosheets have gained significant interest due to their simple fabrication, precise atomic thickness, and controllable physicochemical properties, through versatile nano-building blocks and approaches, which place them as one of the efficient separation membranes^[5].

In this work, we are presenting a method to improve the permeability and the stability by constructing bifunctional vertical channels using swift heavy ion (SHI) irradiation. The graphene oxide membrane (GOM) is modified by SHI irradiation creating more bifunctional vertical nanochannels as well as vertical supports in the GO layer, those nanochannels are constructed with the reduced graphene oxide (rGO), and this rGO in the nanochannels prevents swelling of GO caused by water. Compared to the work of combination GO and rGO, we stabilize the GOM with more precisely constructed rGO nanochannels by SHI irradiation. Additionally, the GOM modified by SHI irradiation reduced the GO nanosheets, which improves the rejection performance of GOM for different ions. Furthermore, through the high electronic loss energy characteristics of SHI, more paths with higher permeation were constructed between GO nanosheets to increase the flux. Therefore, our strategy of modification of GOM by SHI irradiation for the construction of bifunctional vertical nanochannels can enhance the stability and nanofiltration performance, which may provide new ideas for GOM preparation strategy (Fig. 1).

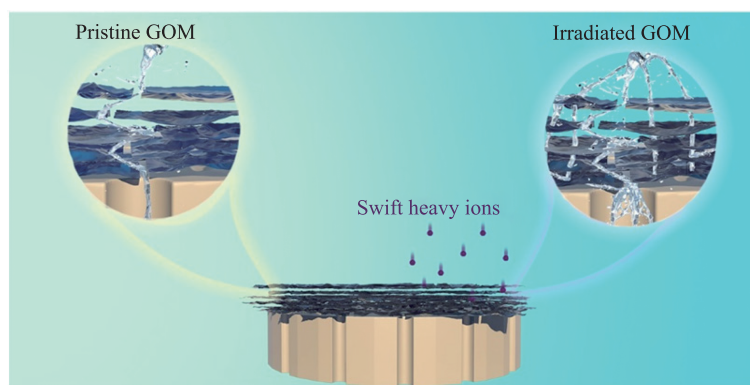


Fig. 1 (color online) Schematic diagram of construction of bifunctional vertical nanochannels in GOM with swift heavy ion irradiation.

References

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