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## Asymmetric porous monovalent cation perm-selective membranes with an ultrathin polyamide selective layer for cations separation

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### Abstract

Highly permeable and selective membranes are desirable for mono/divalent cations separation. Here, we report the fabrication of a novel monovalent cation perm-selective membrane (MCPM) for selective cations separation *via* electrodialysis. The selective layer was fabricated *via* interfacial polymerization of ethylenediamine, tetraethylenepentamine and polyethyleneimine with 1,3,5-benzenetricarbonyl trichloride on the hydrolyzed polyacrylonitrile porous substrate. The negatively charged porous substrate and ultrathin polyamide selective layer could offer multidimensional channels for ions transport. In addition, the transport of large-sized Mg<sup>2+</sup> was greatly intercepted by the compact polyamide selective layer, thus the perm-selectivity was significantly improved. High perm-selectivity ( $P_{Mg^{2+}}^{Na^+}=3.3$ ) which is 94% higher than that of a commercial MCPM was obtained, meanwhile it maintained good Na<sup>+</sup> flux ( $J_{Na^+}=4.27 \times 10^{-8}$  mol cm<sup>-2</sup> s<sup>-1</sup>) at a current density of 14 mA cm<sup>-2</sup>. Furthermore, such unique structure also lead to high limiting current density and excellent long-term stability.

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