

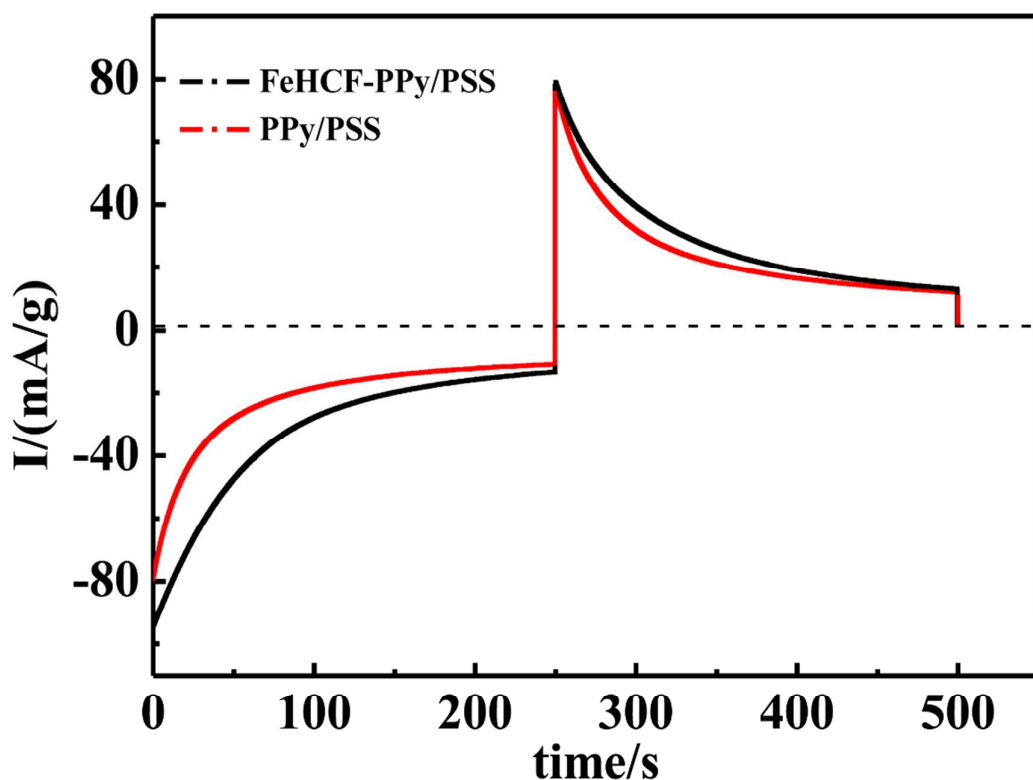
## Supporting Information

### An *in-situ* potential-enhanced ion transport system based on FeHCF-PPy/PSS membrane for the removals of $\text{Ca}^{2+}$ and $\text{Mg}^{2+}$ from dilute aqueous solution

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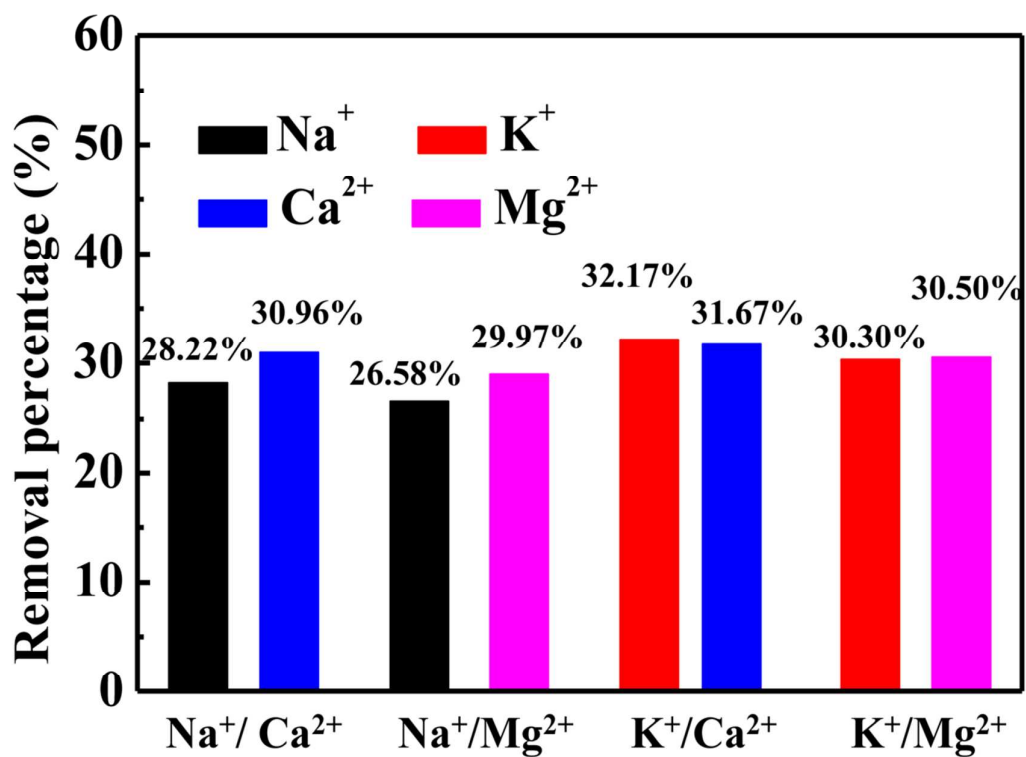
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**Fig. S1** Current-time curves of FeHCF-PPy/PSS and PPy/PSS membranes (electrodeposited PPy/PSS for 1 h) between -1 V reduced state and 1 V oxidized state in 0.1 M  $\text{KNO}_3$

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**Fig. S2** Removal percentages of Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup> and K<sup>+</sup> of the binary solutions of Ca(NO<sub>3</sub>)<sub>2</sub>/NaNO<sub>3</sub>, Ca(NO<sub>3</sub>)<sub>2</sub>/KNO<sub>3</sub>, Mg(NO<sub>3</sub>)<sub>2</sub>/NaNO<sub>3</sub> and Mg(NO<sub>3</sub>)<sub>2</sub>/KNO<sub>3</sub> with pulse potential (-1 V to 1 V, pulse width: 60 s) and 5 V cell voltage for 5 h.