Abstract Submitted
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Ion transport in self-assembled 2D nanofluidic channels constructed by graphene oxide sheets cross-linked with glyoxal and ethylenediamine monomers.[1] CHIH-CHANG CHANG, WEI-HAO HUANG, Department of Refrigeration, Air Conditioning and Energy Engineering, National Chin-Yi University of Technology — Graphene oxide (GO) sheets in aqueous solution becomes negatively charged due to the dissociation of surface functional group (e.g., -OH, -COOH). Therefore, the membrane constructed by GO sheets would disintegrate owing to electrostatic repulsion. In this work, two monomers (glyoxal and ethylenediamine) were used for cross-linking GO sheets to construct composite graphene oxide-framework (GOF) membranes with 2D nanofluidic channels through the vacuum filtration method. Results of X-ray diffraction (XRD) showed that d-spacing in GOF layers (nanochannel size) is tuned to a value of approximately 1 nm in wet state. The stretching of d-spacing could be effectively suppressed and the stability of GOF membranes in aqueous solution was greatly improved. Finally, the ion transport and nonlinear current-voltage characteristics of these GOF membranes in salt (KCl) solution were investigated experimentally. The results showed that ion transport through GOF membrane begins to deviate from bulk behavior up to the salt concentration of 0.01M and gradually plateaus at low salt concentrations, i.e., the surface-charge-governed ion transport in 2D GOF nanofluidic channels. The nonlinear $I-V$ characteristic of GOF membranes due to concentration polarization was also observed.

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