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Experimental study on polydisperse nanochannel system with dispersity and voltage variation LONGNAN LI, DAEJOONG KIM, Department of Mechanical Engineering, Sogang University — Ion exchange membrane (IEM) has great potential for the biological, chemical, energy and desalination applications. Generally, IEM is fabricated by the polymer material and it has non-uniform size of nanopore (nanochannel) matrix structure. We can explain this kind of nanopore non-uniformity by the dispersity of different size of nanopores. The property of IEM strongly depends on nanopore dispersity as the degree of electric double lalyer (EDL) overlap in the nanopore is depend on nanopore dimension. In this study, polydisperse nanochannel array was fabricated on the silicon wafer to model realistic IEM. To investigate ion transporting behavior through polydisperse nanochanel array, concentration polarization (CP) phenomena is examined. To quantitatively show the CP phenomena in the polydisperse nanochannel system, dispesity of nanochannels and applied voltage are examined as a variable. The experiment result shows that the high dispersity nanochannel system (even with 50% dispersity) still show typical CP behavior that depletion zone at the anodic side of nanochannel. For the voltage-current characteristics of polydisperse nanochannel system, the mononanochannel (50 nm) system and lower dispersity (12.5%) system show typical behavior of CP process.

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