

Abstract Submitted
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Energy harvesting through charged nanochannels using external flows of different salt concentrations SOURAYON CHANDA, PEICHUN AMY TSAI, Mechanical Engineering, University of Alberta — Renewable electricity may be generated by mixing of two solutions of different salt concentrations through charged nanochannels or pores, by leveraging ion-selective effect of the nano-confinements. We numerically investigate such a continuous power generation system using reverse electrodialysis (RED) with external flows. In the simulation model, two reservoirs are connected using a nanochannel of constant surface charge density. Solutions of high and low concentrations flow through the two reservoirs at a constant velocity. We examine the effects of (salt) concentration gradients and nanochannel dimensions on the power generation. Moreover, the effect of external flow velocity on the process is analyzed. Our results show that the maximum surface charge density, open circuit voltage, channel resistance, and energy conversion efficiency of the process are significantly affected by the difference of the high and low concentrations and the nanochannel dimension ratio.

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