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# Energy harvesting device with nano-fluidic reverse electro-dialysis

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Energy harvesting technology has recently gained attraction as it enables the utilization of diverse ambient energy sources. Clean and sustainable energy generation from ambient environments is important not only for large scale systems but also for tiny electrical devices, because of the limitations of batteries or external power sources. Reverse electro-dialysis (RED) is such a technique that converts electrical energy from the concentration gradient between a concentrated solution (e.g., seawater) and a diluted solution (e.g., fresh water). We experimentally investigated a RED device using two types of nano-fluidic pores: Nano-porous polycarbonate track-etch membranes and self-assembled nano-pore networks. Highly effective cation-selective nano-channel networks are realized between two microfluidic channels with geometrically controlled in situ self-assembled nanoparticles in a cost-effective and simple way. The nano-interstices between the assembled nanoparticles have a role as collective three-dimensional nano-channel networks and they allow higher ionic flux under concentration gradients without decreasing diffusion potential, compared to standard one-dimensional nano-channels. We performed the parametric study by varying the concentration differences, the pore size, and the electrolyte types. We characterized the RED performance in terms of maximum voltage, maximum current, and maximum power. This microfluidic power generation system can be readily integrated with existing lab on chip systems in the near future and can also be utilized to investigate nanoscale electro-kinetics.

## Biography

Daejoong Kim has completed his PhD at Stanford University in 2007. He then worked as a Post-doctoral Research Associate at University of Illinois, Urbana-Champaign until he joined the Faculty of So-gang University in 2008. He has published more than 40 papers in archived journals for the last ten years and served as a reviewer and sometimes as an editor for numerous reputed journals and conferences.

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