

Abstract Submitted  
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**Capillary Ion Concentration Polarization for Power-Free Salt Purification**<sup>1</sup> SUNGMIN PARK, ECE, SNU, YEONSU JUNG, MAE, SNU, IN-HEE CHO, ECE, SNU, HO-YOUNG KIM, MAE, SNU, SUNG JAE KIM, ECE, SNU — In this presentation, we experimentally and theoretically demonstrated the capillary based ion concentration polarization for power-free salt purification system. Traditional ion concentration polarization phenomenon has been studied for a decade for both fundamental nanoscale fluid dynamics and novel engineering applications such as desalination, preconcentration and energy harvesting devices. While the conventional system utilizes an external power source, the system based on capillary ion concentration polarization is capable of perm-selective ion transportation only by capillarity so that the same ion depletion zone can be formed without any external power sources. An ion concentration profile near the nanostructure was tracked using fluorescent probes and analyzed by solving the modified Nernst-Planck equation. As a result, the concentration in the vicinity of the nanostructure was at least 10 times lower than that of bulk electrolyte and thus, the liquid absorbed into the nanostructure had the low concentration. This mechanism can be used for the power free salt purification system which would be significantly useful in underdeveloped and remote area.

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