

Supplementary Information

Electrodifusioosmosis induced negative differential resistance in micro-to-millimeter size pores through graphene/copper membrane

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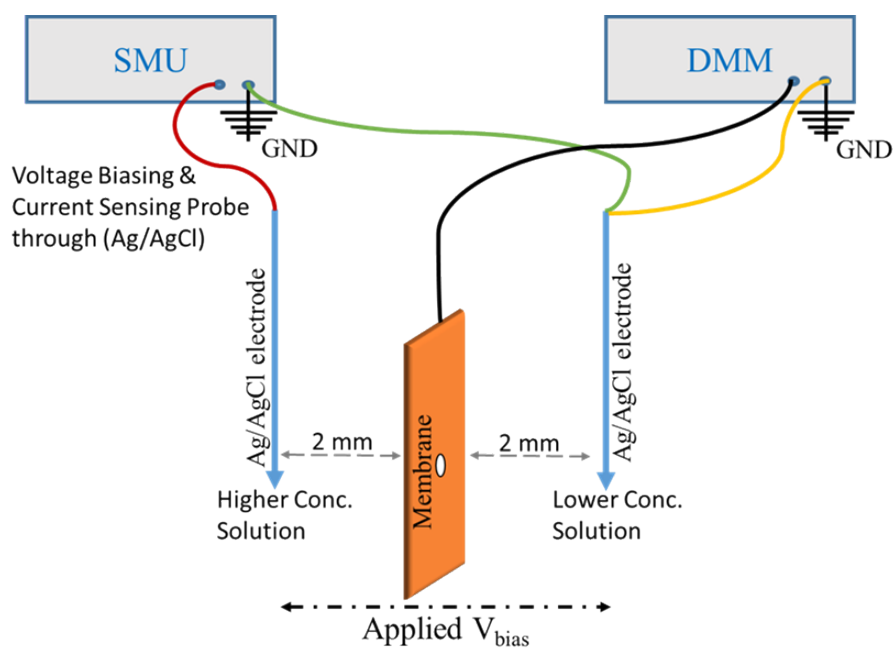


Figure S1. Schematic of the experimental setup connections and the steps to sandwich the Gr/Cu membrane between the silicone O-ring.

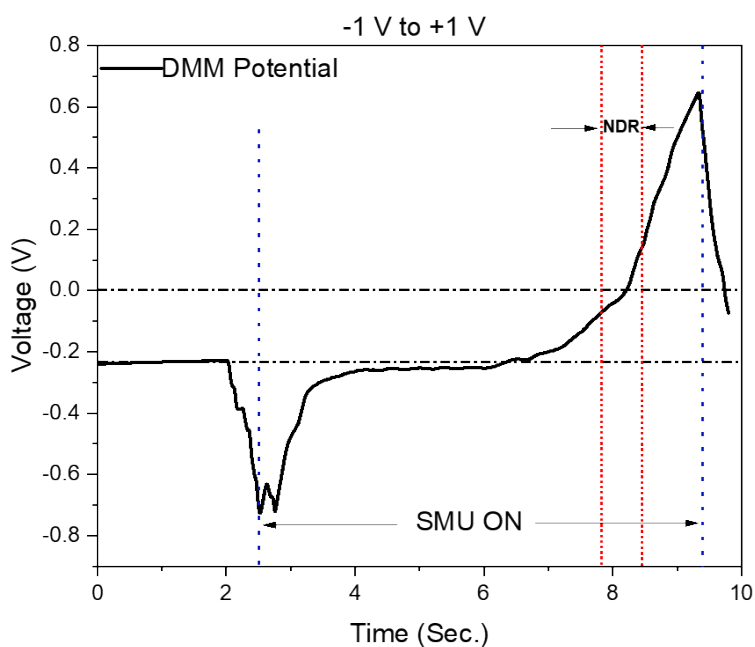


Figure S2. The Variation in the membrane potential by applying the source potential in the range -1 V to +1 V to the electrodes using SMU. The membrane potential was recorded using DMM. 1 mm single pore is used at a concentration gradient of $\nabla C=1000$.

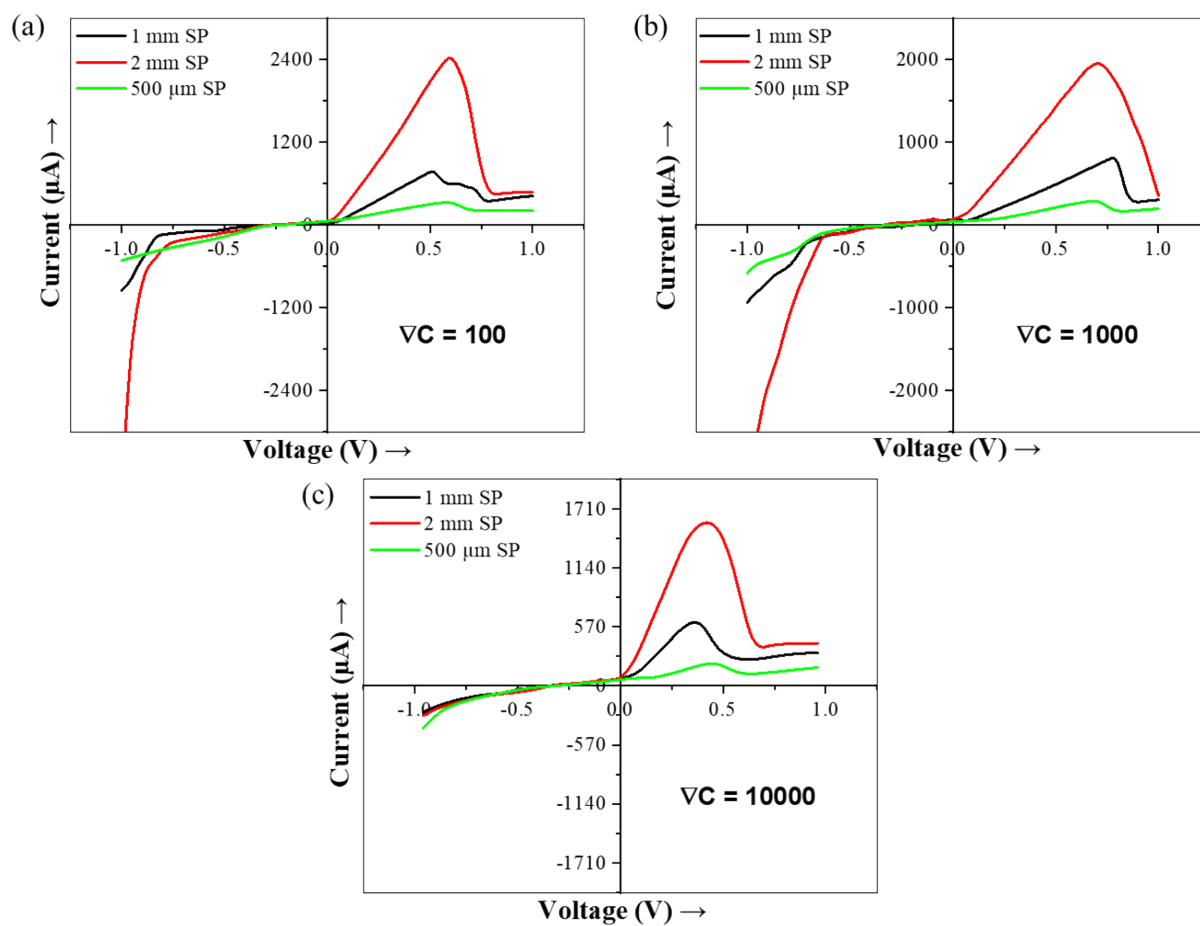


Figure S3. The I-V plot of the ion transport through different pores at concentration gradient of (a) $\nabla C = 100$, (b) $\nabla C = 1000$, (c) $\nabla C = 10000$. The black, red, and green color line curve represents the pore diameter of 1 mm SP, 2 mm SP, and 500 μm SP, respectively. SP corresponds to a single pore.

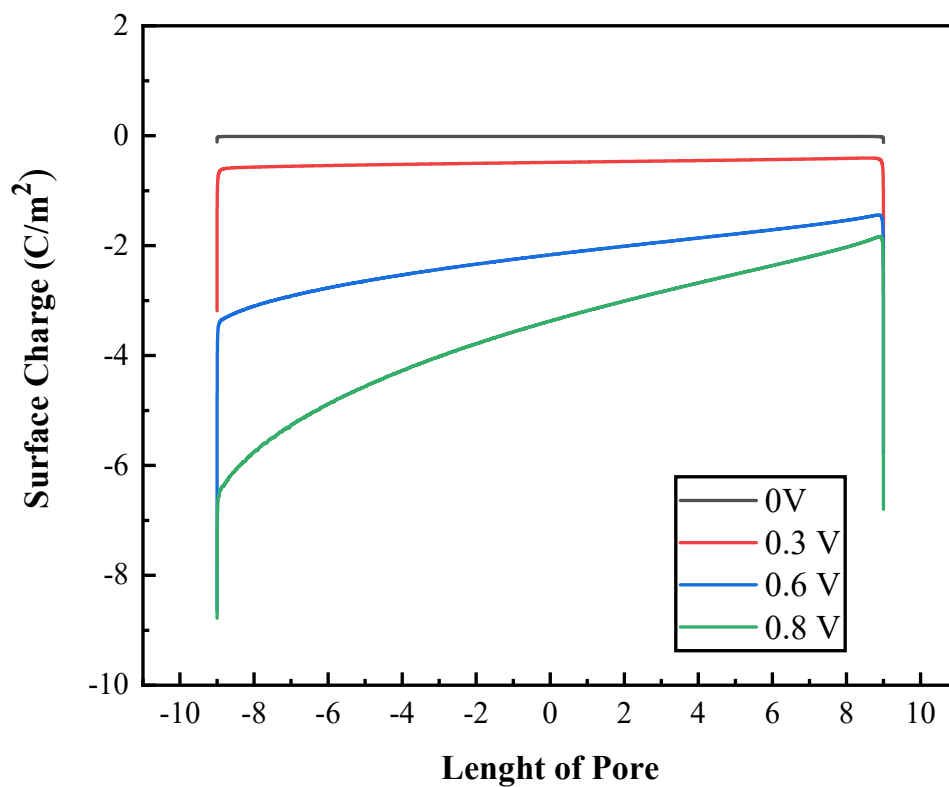


Figure S4. The surface charge variation along the pore length at various applied voltages.

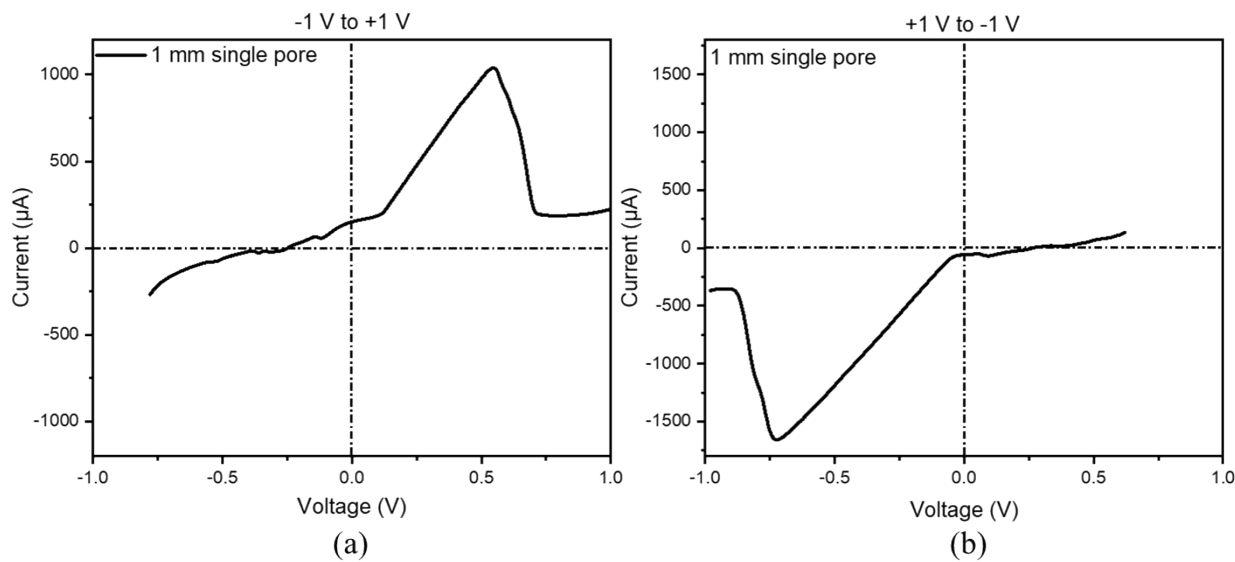


Figure S5. The I-V characteristic by applying the source potential **(a)** -1 to +1 V and **(b)** +1 to -1 V using 1 mm single pore at $\nabla C=1000$.