

Supporting Information for
Nanofluidic proton channels based on 2D layered glass membrane
with improved aqueous and acid stability

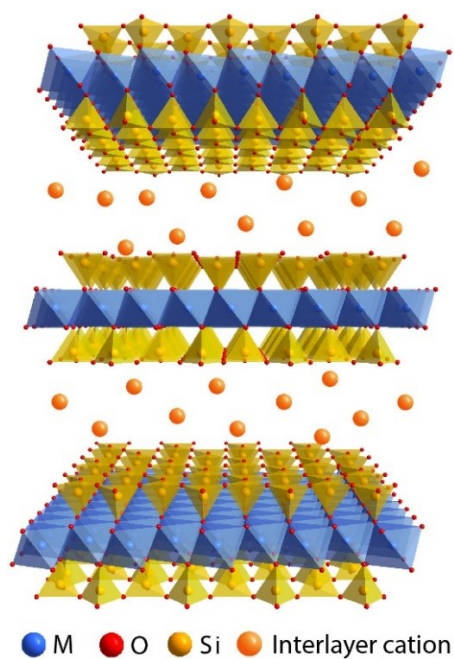


Figure S1 The sandwich structure of vermiculite. The yellow layers are silicon-oxygen tetrahedron, and the blue layer is magnesium/aluminum-based octahedron. M stands for metal cation impurities such as Al^{3+} , Mg^{2+} , Fe^{3+} .

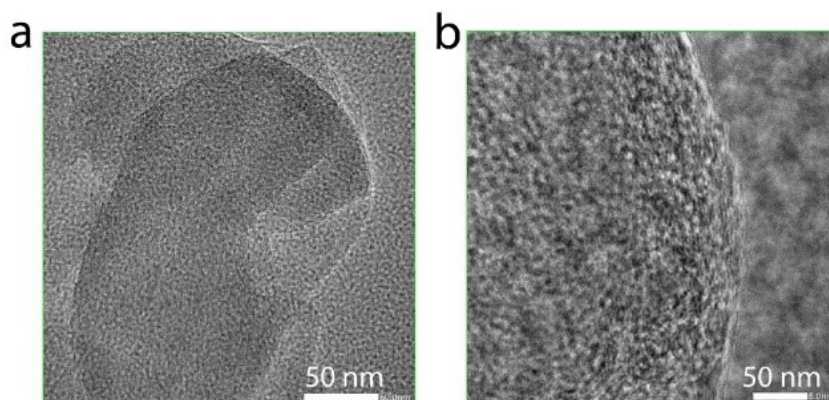


Figure S2 TEM of 2D silica nanosheets. The 2D silica nanosheets nanosheet has no obvious lattice fringes, indicating that it is amorphous.

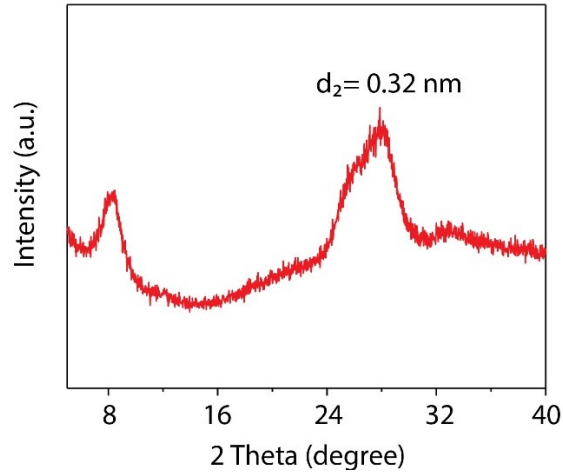


Figure S3 X-ray diffraction image of LGM. The broad band between 24° to 30° is assigned to amorphous silica. The peak at 8.2° corresponds to the interlayer spacing, and suggests the laminar structure.

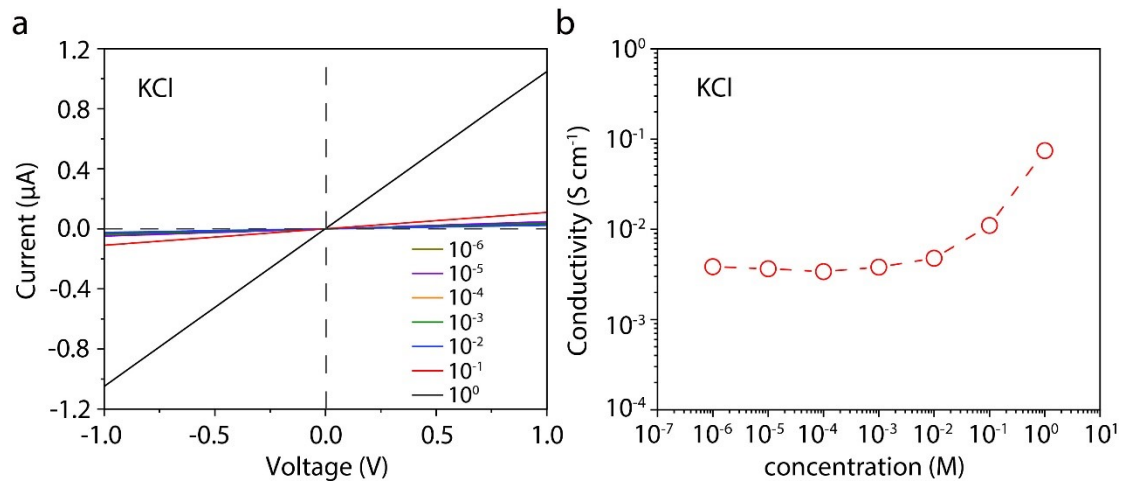


Figure S4 (a) $I-V$ characteristic curve under concentrations of KCl solution. (b) The variation of the conductivity of LGM nanochannels under varying concentrations of KCl solution.

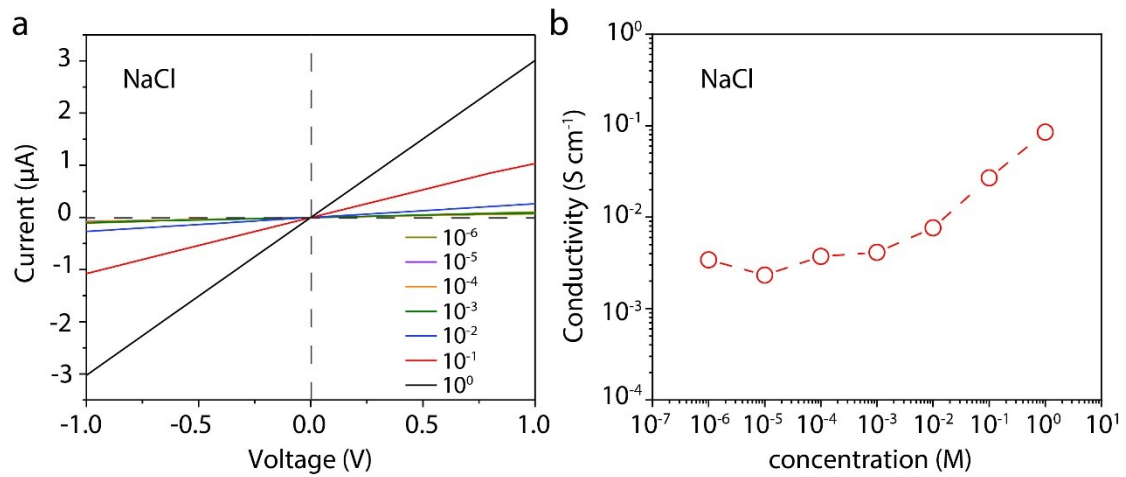


Figure S5 (a) I-V characteristic curve under concentrations of NaCl solution. (b) The variation of the conductivity of LGM nanochannels under varying concentrations of NaCl solution.

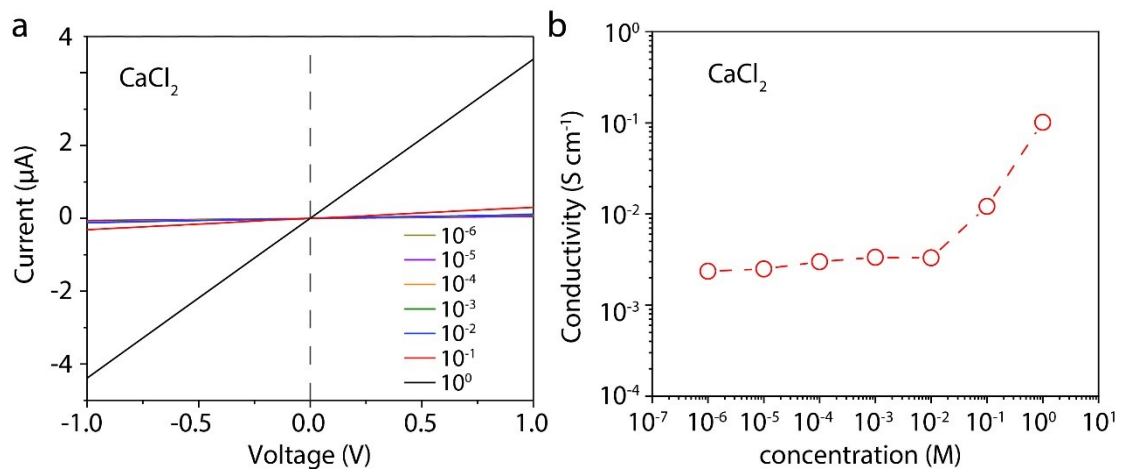


Figure S6 (a) I-V characteristic curve under concentrations of CaCl₂ solution. (b) The variation of the conductivity of LGM nanochannels under varying concentrations of CaCl₂ solution.

Table S1 Element composition of layered vermiculite membranes (VM)

Element	Mass (%)	Atom (%)
O	55.56	68.41
Si	18.48	12.96
Mg	13.99	11.34
Al	8.12	5.93
Fe	3.85	1.36
Total	100.00	100.00