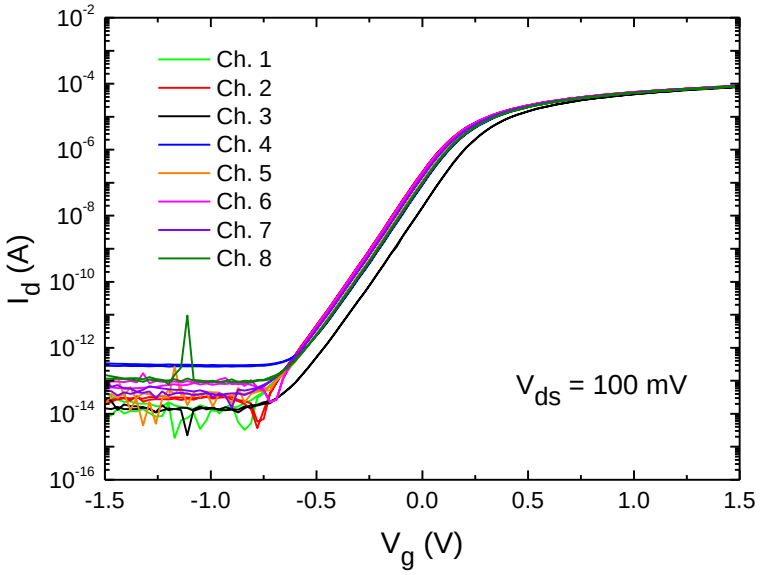
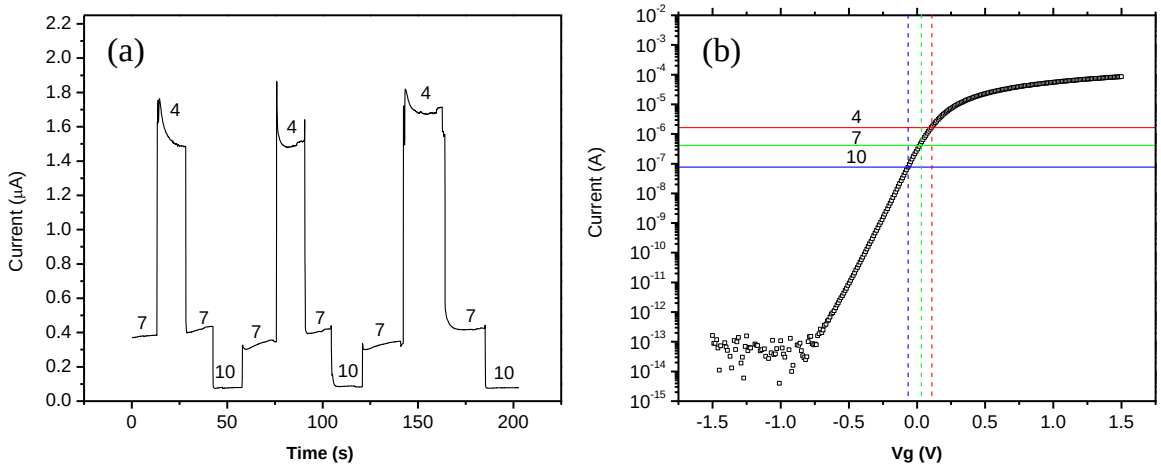
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Supplementary Figure



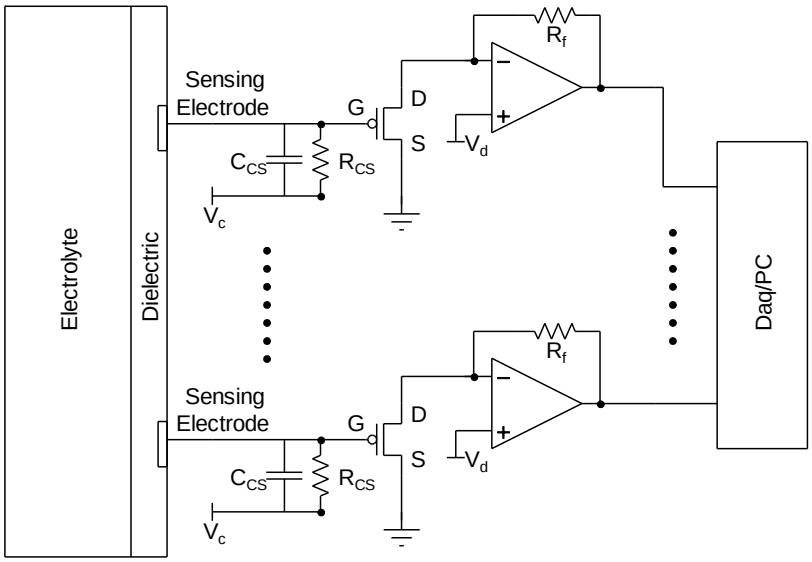
Supplementary Figure S1 | Back-end MOSFETs characterizations. The Drain to source voltage is held at 0.1 V. This curve serves as a look-up table for converting the measured drain current into the floating sensing electrode potential (V_S).

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Supplementary Figure S2 | Methods to extract the floating sensing electrode potential (V_S) from the measured I_d value at various electrolyte condictions. (a) Time course of the drain current I_d for SiN_x sample under various pH conditions. (b) Procedures to find the corresponding floating sensing electrode potential at various pH conditions. Each drain current baseline is used to extract V_S by using the I_d-V_{gs} curve tested off-line before performing any surface charge measurements.

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Supplementary Figure S3 | Schematic of the readout circuit for probing the charging status at the dielectric-electrolyte interface.

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Supplementary Movie

The supplementary movie shows the response of the testing system to a moving hand around. The whole testing system is extremely sensitive to the electrostatic environment around. Therefore, it is essential to place the whole testing system inside a Faraday cage for a reliable electric measurement of the surface charge developed at the dielectric/electrolyte interface.