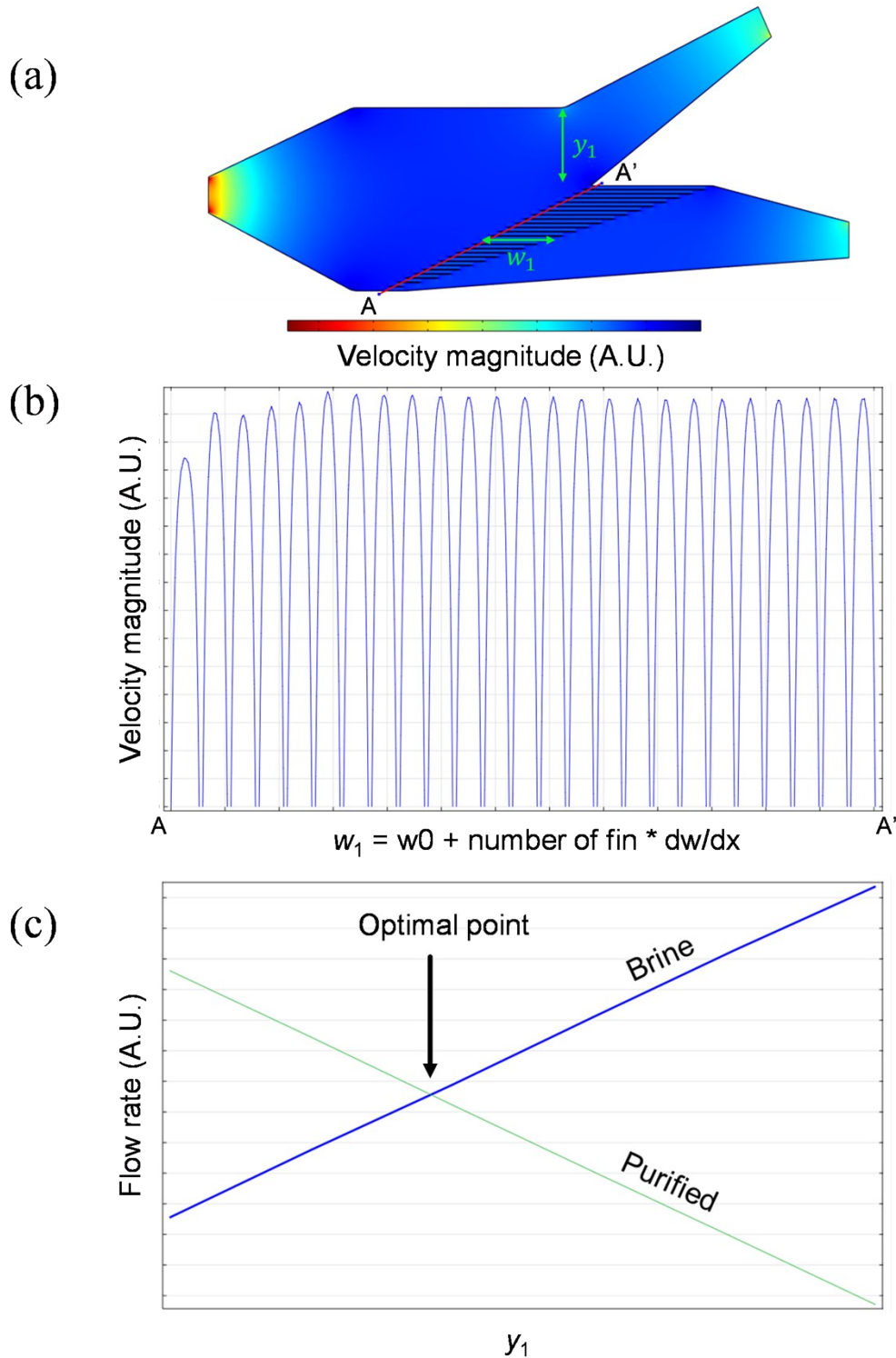Supporting information for

Stabilization of Ion Concentration Polarization Layer using Micro Fin Structure

for High-Throughput Applications

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**1. Numerical simulation for equal division of flow rate in continuous ICP separator**

Numerical simulation was conducted using COMSOL Multiphysics. The numerical domain was depicted in SI Figure (a) and the pressure field, velocity field and flow rate was obtained using fluid dynamics module. No slip condition was assigned in physical wall. Inlet had constant flow rate condition and outlet had no viscous stress condition. $w_1$ and $y_1$ were adjusted to have the same fluidic resistance in between each fin (SI Figure (b)) and the equal division of input flow rate (SI Figure (c)), respectively.

(a)

$y_1$

A'

$w_1$

Velocity magnitude (A.U.)

(b)

Velocity magnitude (A.U.)

A

$w_1 = w0 + \text{number of fin} * dw/dx$

A'

(c)

Optimal point

Brine

Flow rate (A.U.)

Purified

$y_1$

**SI Figure**. (a) Schematics of continuous ICP separator and the pressure field inside the device with fin structure. (b) The magnitude of velocity field along A-A', showing a series of parabolic profile in between each fin. Uniform pressure distribution was obtained by adjusting the length of each fin. (c) The flow rates of brine stream and purified stream. The equal division was obtained by arranging $y_1$. The cross sectional area of purified channel with fin structure was the same to the one of the device without fin structure.