

## Supplementary Information

### Non-invasive hERG Channel Screening based on Electrical Impedance Tomography and Extracellular Voltage Activation (EIT-EVA)

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#### S1. Electroless Nickel Immersion Gold (ENIG) coating effect

The effect of ENIG coating was investigated by comparing the Nyquist plot of two types of electrodes as shown in Fig. S1. The frequencies used in the Nyquist plot are 500 kHz, 707 kHz, and 1 MHz. ENIG coating causes the extracellular resistance  $R_{ex}$  to increase as compared to the non-ENIG electrode. This difference does not have an effect to our  $IC_{50}$  calculation because we normalized  $R_{ex}$  according to Equation 2:

$$R'_{ex} = \frac{R_{ex}}{R_{max} - R_{min}} \quad (2)$$

#### S2. Simulation of pDEP electric field

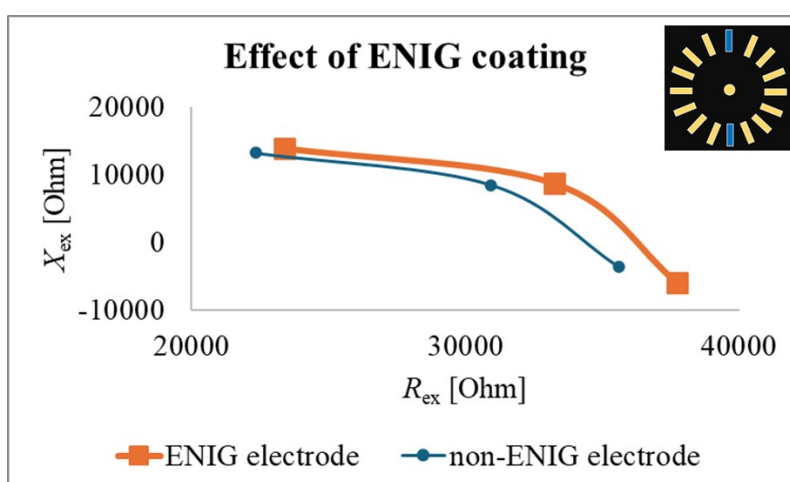


Figure S1. Comparison of ENIG-coated electrode with non-ENIG electrode.

Positive dielectrophoresis (pDEP) electric field was simulated in COMSOL Multiphysics software. The frequency is 10 MHz and the voltage is 20 Vpp. Fig. S2(a) shows the electric field distribution of the pDEP. Fig. S2(b) shows the electric field component of the DEP force in term of  $|\nabla|E|^2|$  which shows that the dominant DEP force is around the central electrode. From the calculation of Fig. S2(b),

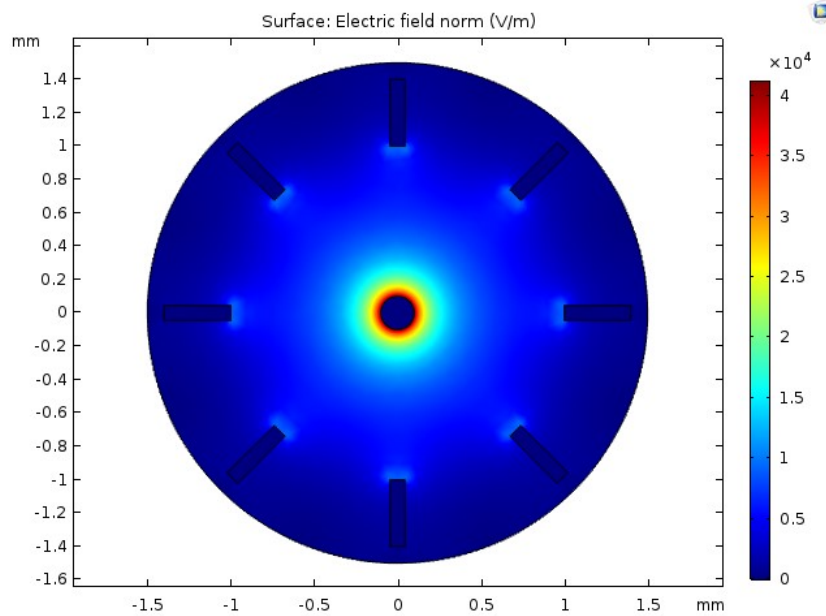


Figure S2(a) Electric field distribution of the pDEP

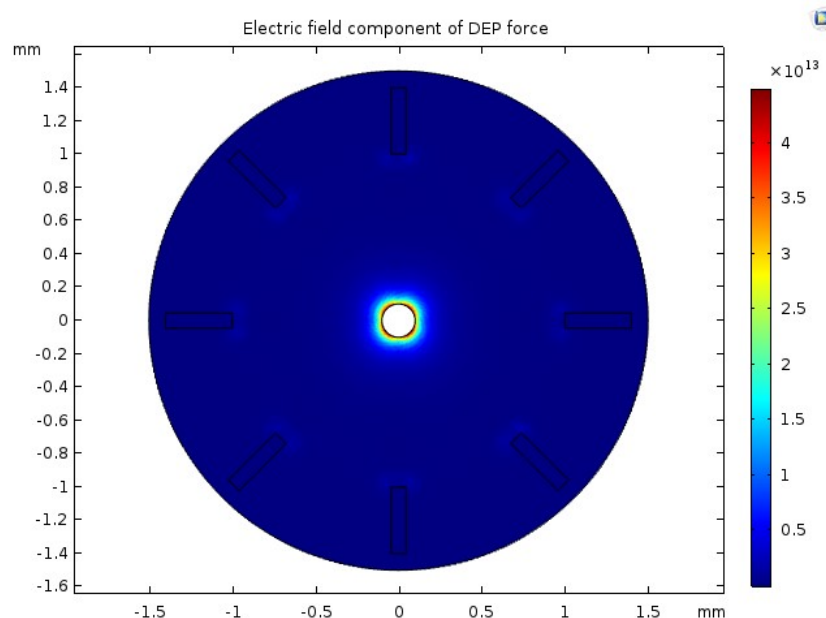


Figure S2(b) Electric field component of pDEP force

we found that the effective region of the DEP force is at 0.15 mm radius from the center.

### S3. Evaporation effect

We checked the only medium normalized resistance  $R'_{ex}$  to make sure that evaporation has no effect

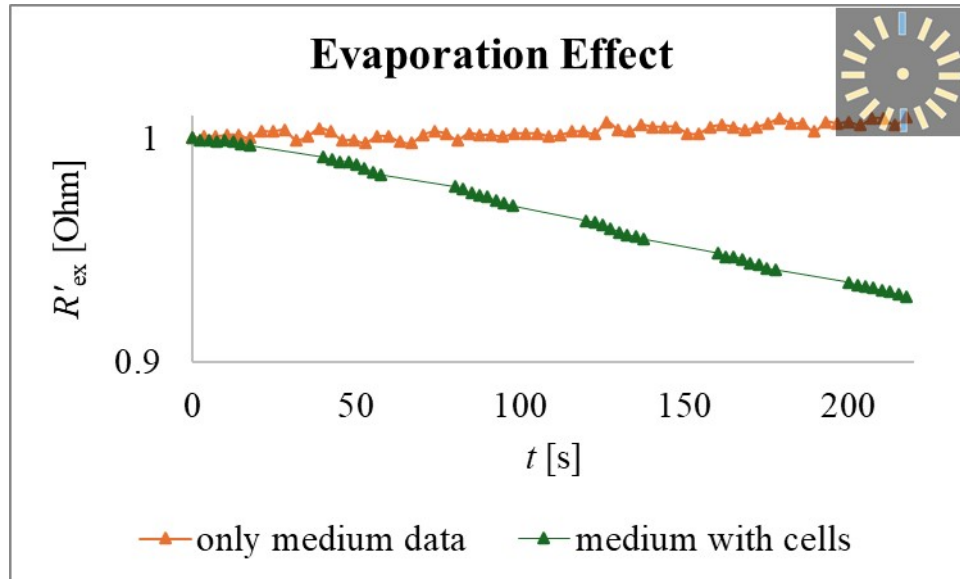


Figure S3. Extracellular resistance  $R'_{ex}$  of only medium data compared with cell suspension.

on the EIT-EVA measurement as shown in Fig. S3.

### S4. Baseline normalized extracellular resistance of various drug concentrations

The slope of the normalized extracellular resistance without EVA  $R'_b$  does not change when various concentrations of the drug is applied to the cells as shown in Fig. S4.

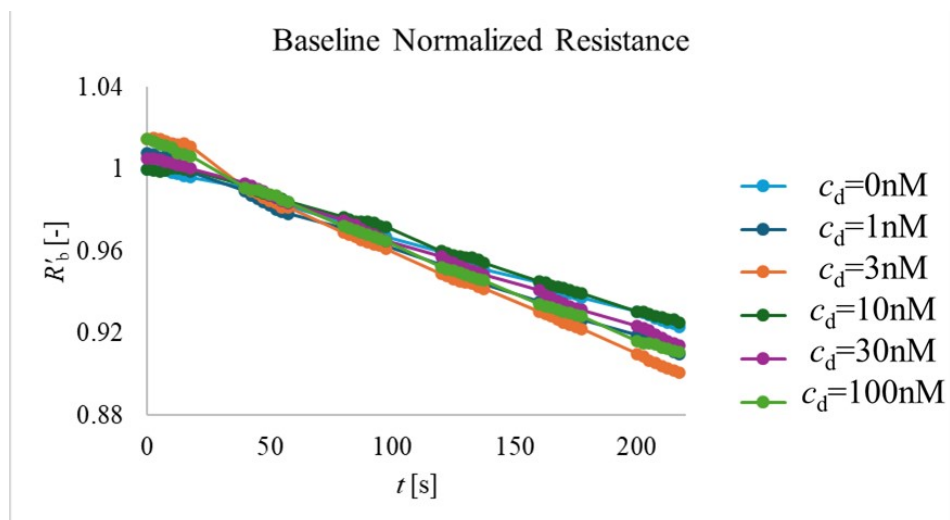


Figure S4.  $R'_b$  of various drug concentrations.