

# Robust Three-dimensional Carbon Nanotube-in-Micropillar Array Electrodes to Facilitate Size Independent Electroporation in Blood Cell Therapy

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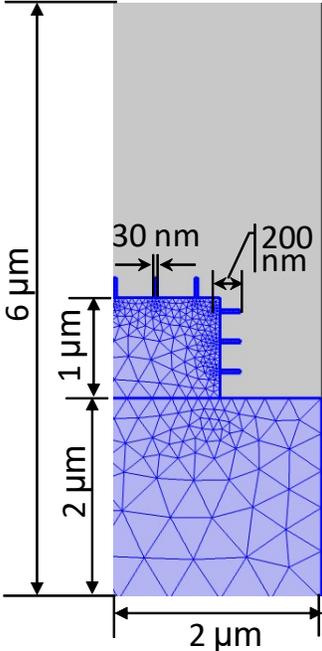
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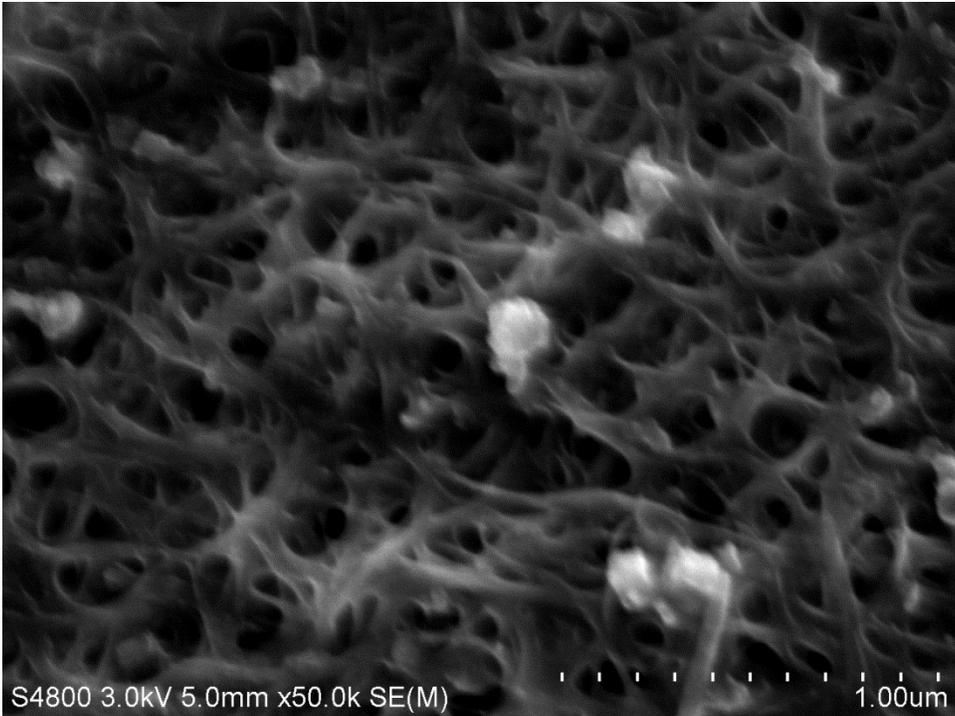
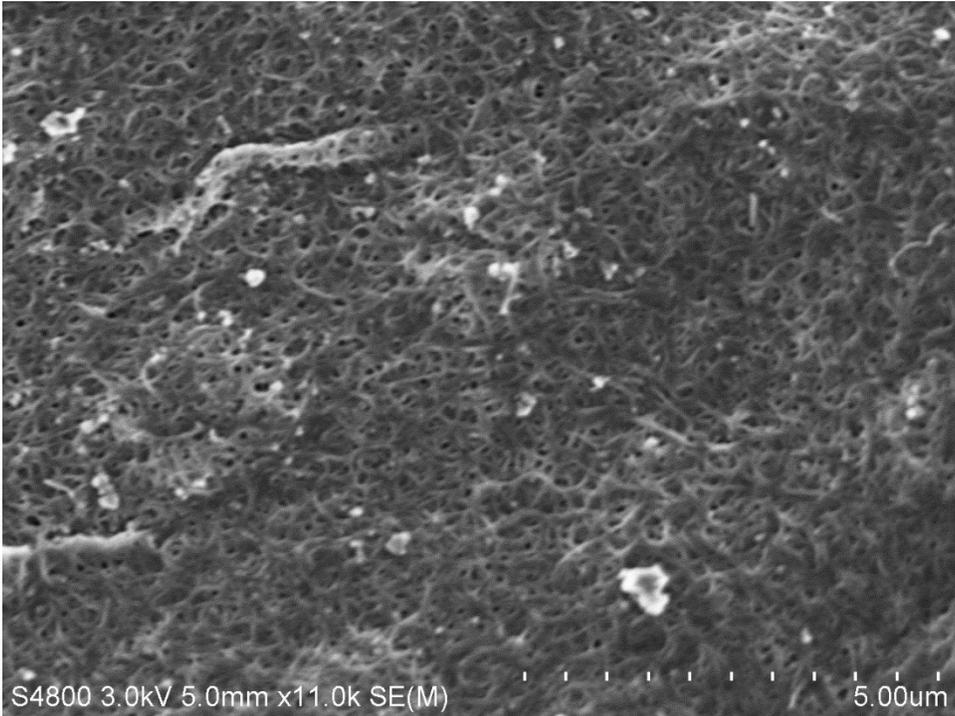
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**Keywords** : Electroporation, 3D Nanoelectrode, Carbon Nanotubes, Micropillar Array, Micromolding

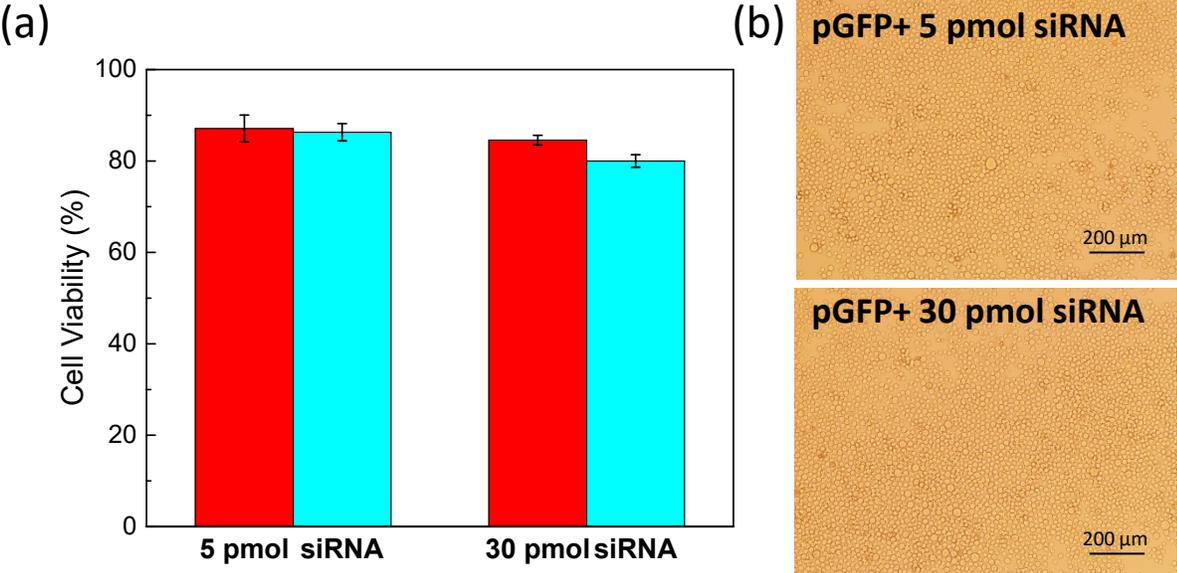
Supp Figure 1. Geometry and dimensions of CNT Nanotube-in-Micropillar Array electrode used in COMSOL simulation.



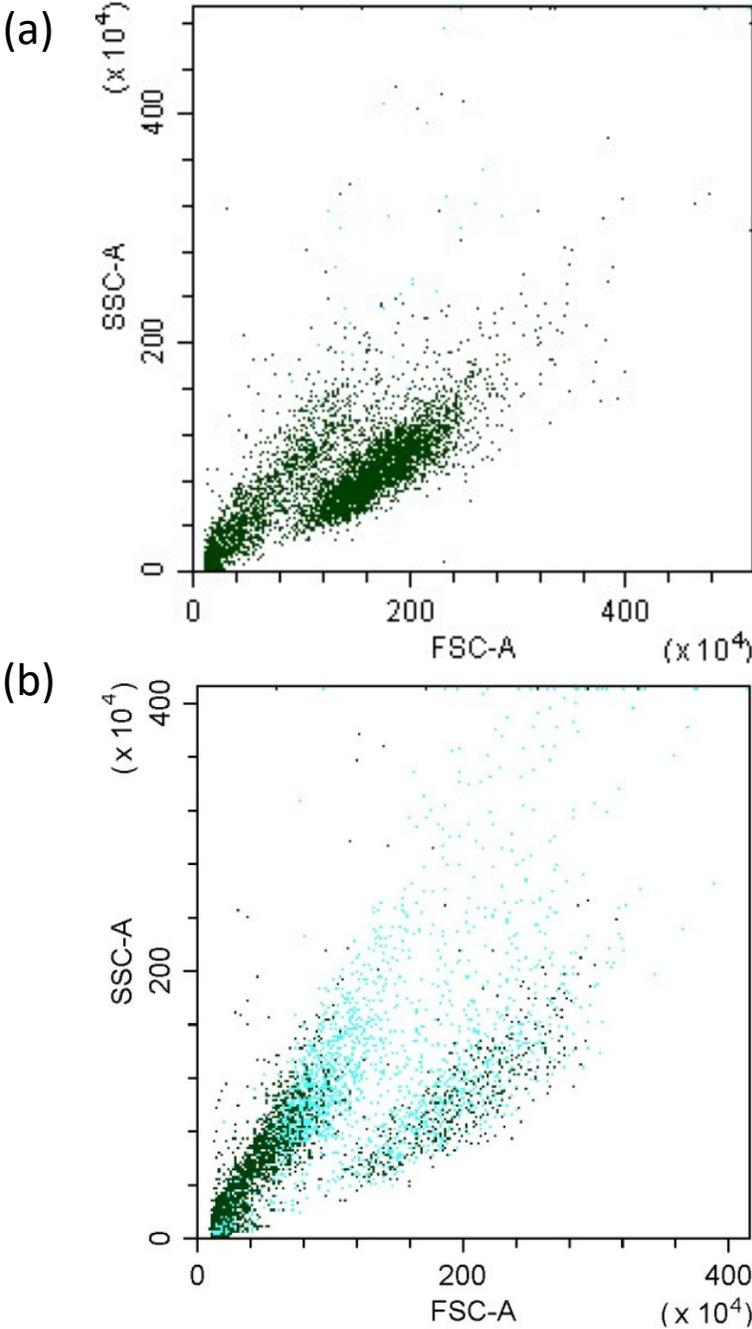
Supp Figure 2. SEM images of CNT-coated electrode without micropillar pattern.



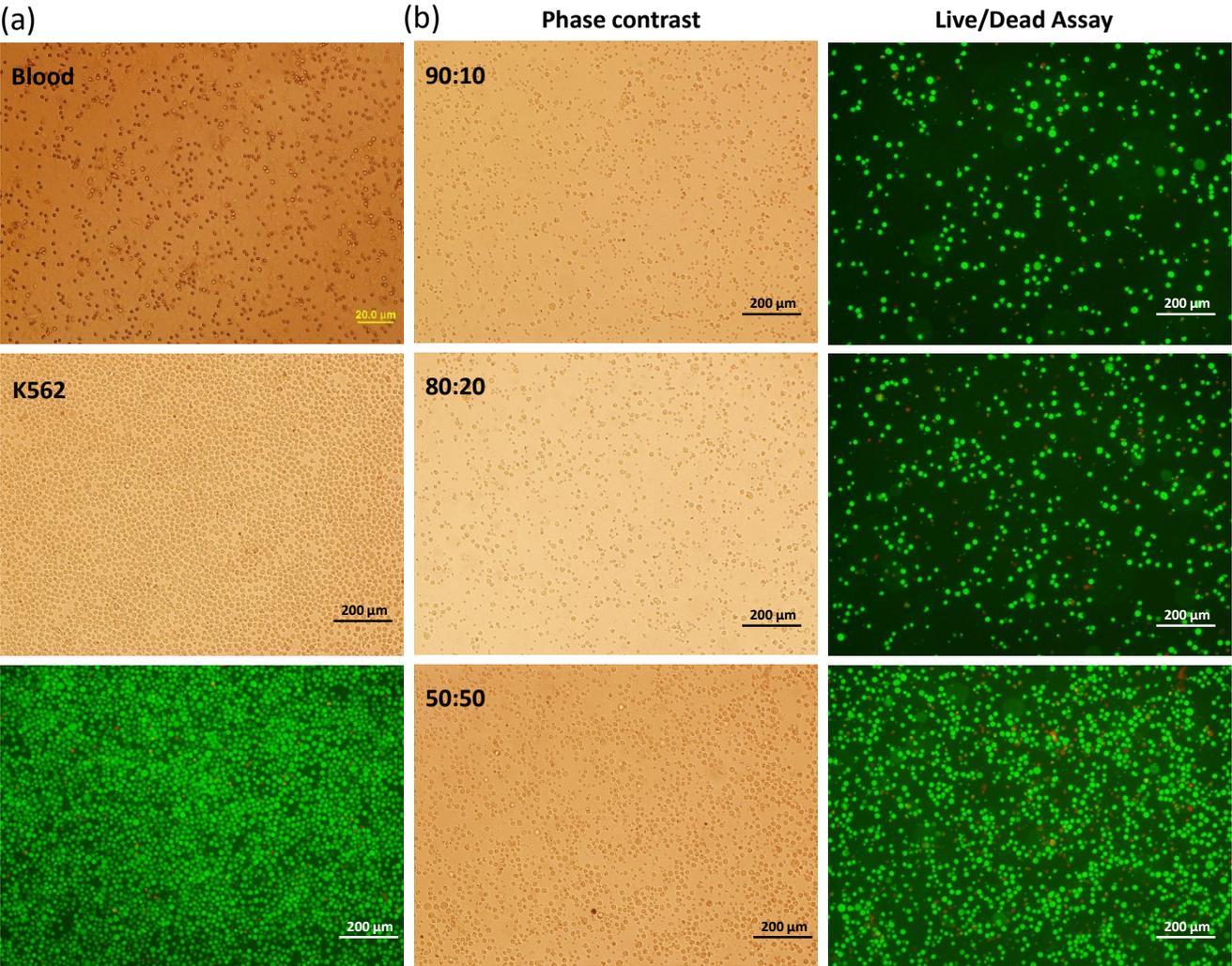
Supp Figure 3. Cell viability (a) and microscopic images of (b) in K562 cells when co-transfecting GFP plasmid and siRNA probes that down regulate GFP translation. In panel a, red column is for “BE” treatment and blue column is for “CNT-BME” treatment.



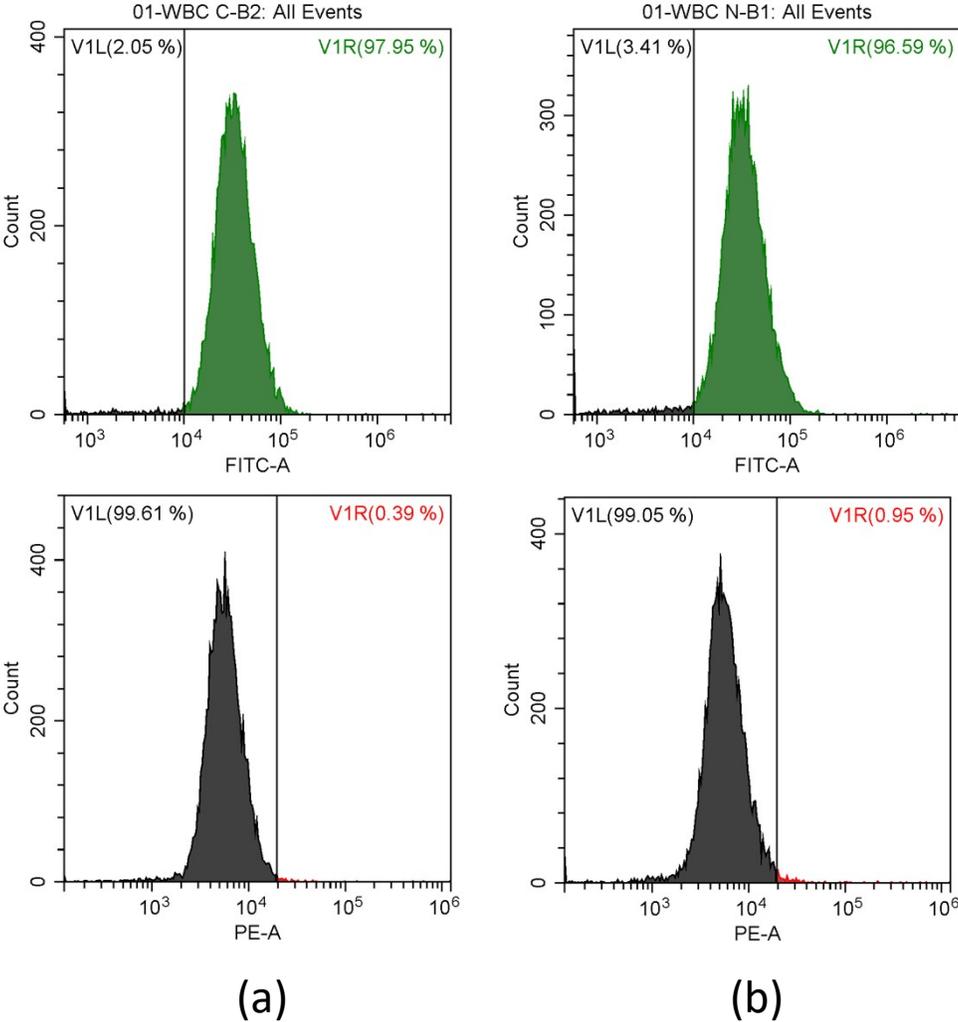
Supp Figure 4. Flow cytometry results of (a) the negative control sample and (b) electroporation sample treated using CNT-coated electrode without micropillar pattern (denoted as “CNT” in Figure 4 and sections 3.2 & 3.5).



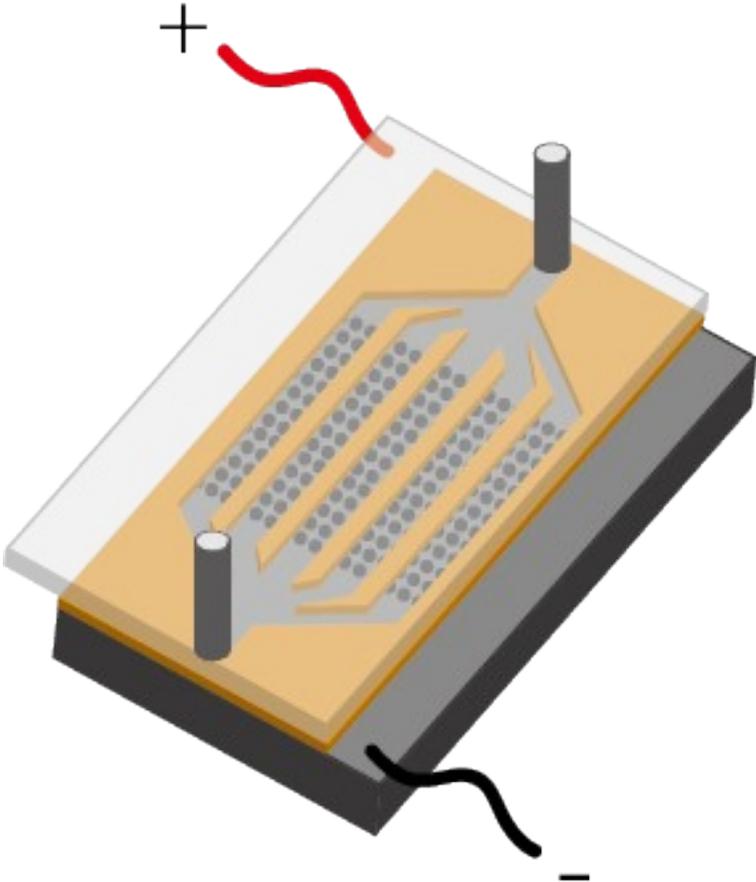
Supp Figure 5. Microscopic images of (a) negative control of whole blood and K562 cells, and (b) mixtures of K562 cells and whole blood cells treated using CNT-BME electrode. Note: Green: live cells; Red: dead cells. To clearly see RBCs, the magnification of the whole blood image is 20x and its scale bar is 20  $\mu\text{m}$ , which is different from the rest images.



Supp Figure 6. Flow cytometry results on instant cell viability of (a) negative control and (b) whole blood samples using Live/Dead assay kit. FITC: live cells; PE: dead cells.



Supp Figure 7. Schematic of a microfluidic design for multiple-channel, continuous flow operation of the CNT-BME system with the two electrodes of CNT-BME serve as the top and bottom channel walls.



Supp Figure 8. Nyquist plots of multiple units of CNT-implanted micropillar electrodes when they are new or after used.

