

High efficient macromolecule delivery into adhesive cells with metallic nanotube membranes

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Delivering biomolecules into living cells has become an important challenge in medical and biological fields. Conventional molecular delivery techniques are utilized for small molecules, but encounter several problems of low efficiency and low viability for large molecules such as biological proteins and organelles. To overcome this problem, we demonstrate the macromolecular delivery into adhesive cells with metallic nanotube membrane (Fig.1). The metallic nanotube membrane was developed by an electroless plating of gold onto track-etched polycarbonate template and wet/dry etching [1]. To insert Au nanotubes into adhesive cells (HeLa and NIH3T3), we developed the height control system with the fluorescent microscope. In the presentation, we demonstrate the delivery of macromolecules (proteins, nanoparticles(diameter: 30 nm, 200 nm), mitochondria) and discuss the details about the experimental setup, delivery efficiency, and viability.

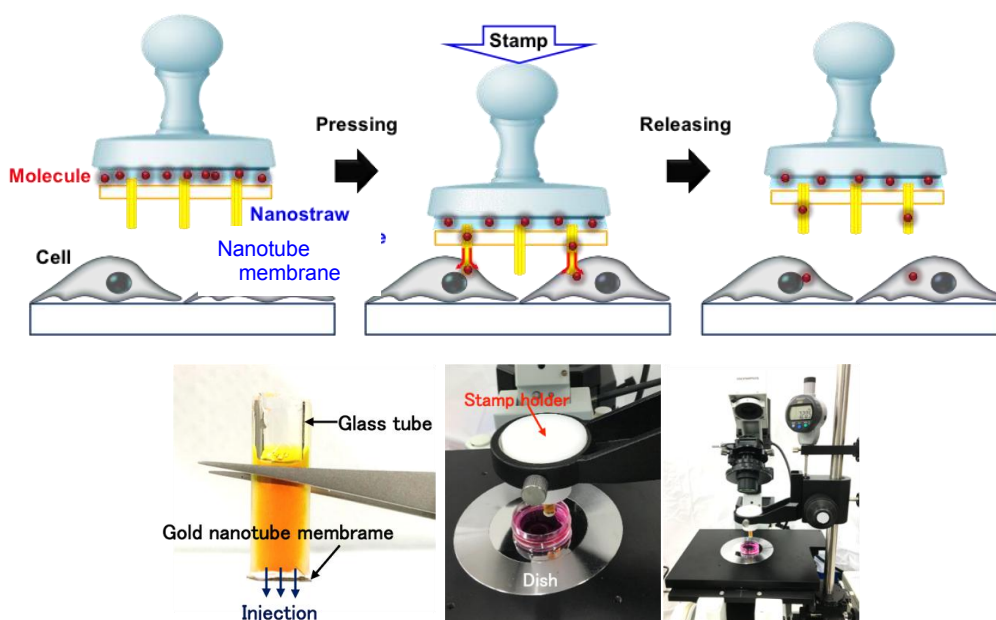


Fig.1 Intracellular molecule delivery system using metallic nanotube membrane

[1]Zhang, Bowen & Shi, Yiming & Miyamoto, Daisuke & Nakazawa, Koji & Miyake, Takeo. (2019). Nanostraw membrane stamping for direct delivery of molecules into adhesive cells. Scientific Reports. 9. 10.1038/s41598-019-43340-1.