

CLAIMS

1. An ex vivo method of delivering a biologically relevant cargo into non-adherent cells, the method comprising:
 - applying an external force to drive a suspension of cells into contact with a plurality of nanostraws, wherein the plurality of nanostraws extend through a substrate and a distance beyond the substrate that is between 2 nm and 50 μm , further wherein the plurality of nanostraws are hollow and have an inner diameter of between 5 nm-1500 nm; and
 - driving the cargo from the nanostraws into an intracellular volume of the cells so that at least 20% of the cells take up the biologically relevant cargo.
2. The method of claim 1, wherein applying the external force comprises moving the nanostraws to contact the cells.
3. The method of claim 1, wherein applying the external force comprises centrifuging the suspension of cells to drive the cells into contact with the plurality of nano straws.
4. The method of claim 1, further comprising incorporating magnetic particles on or in the cells, and wherein applying the external force comprises applying a magnetic field to drive the suspension of cells into contact with the plurality of nanostraws.
5. The method of claim 1, wherein driving the cargo comprises applying a pulsed electrical field.
6. The method of claim 1, wherein the cargo comprises one or more of: nucleic acids or proteins.
7. The method of claim 1, further comprising separating the cells from the nanostraws.
8. The method of claim 7, wherein separating the cells from the nanostraws comprises flowing a solution over the cells.
9. The method of claim 7, wherein separating the cells from the nanostraws comprises reversing the force applied to drive the suspension of cells into contact with the nanostraws.
10. The method of claim 1, wherein the nanostraws are in fluidic communication with a fluidic passage connected to a reservoir of biologically relevant cargo.
11. The method of claim 1, wherein the suspension of cells comprise a suspension of plant cells.
12. The method of claim 1, wherein the substrate comprises a porous structure.
13. An ex vivo method of delivering a biologically relevant cargo into non-adherent cells, the method comprising:
 - applying an external force to drive a suspension of cells into contact with a plurality of nanostraws, wherein the plurality of nanostraws extend through a porous structure and a

distance beyond the porous structure that is between 2 nm and 50 μm , further wherein the plurality of nanostraws are hollow and have an inner diameter of between 5 nm-1500 nm; applying a pulsed electrical field to drive the cargo from the nanostraws into an intracellular volume of the cells so that at least 25% of the cells take up the biologically relevant cargo; and separating the cells from the nanostraws.