# LICENSING OPPORTUNITY: METHODS AND APPARATUS FOR TRANSPLANTATION OF NUCLEIC ACID MOLECULES

## DESCRIPTION

### Problem

Techniques and devices for transplanting large nucleic acid molecules are lacking, deficient, and suffer from extremely low efficiencies. The main challenge is the difficulty in handling fragile, long strands of DNA, such as entire genomes: extraction, pipetting, electroporation, sonoporation, chemical transformation, and other methods commonly used with shorter DNA cannot be applied here due to DNA breakage.

### Invention

An innovative microfluidics device to prevent DNA breakage through the: confinement of cells, gentle handling of nucleic acids, study and control of physicochemical parameters relevant to cell growth and the DNA extraction, manipulation and insertion of DNA, including transplantation of genetic material into cells.

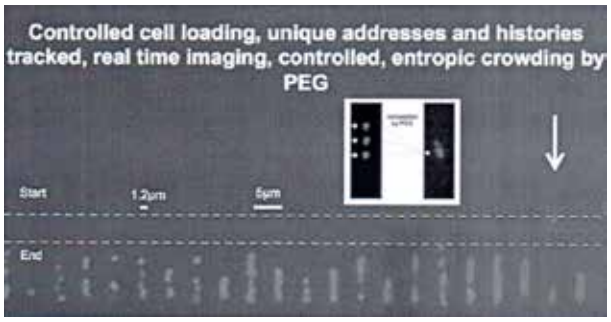
## BENEFITS

### Commercial Application

Applications requiring the use and expression inside cells of isolated, engineered, or synthetic DNA, especially long strands of DNA, such as whole genomes. Foundational capability for whole genome engineering for applications of synthetic biology, including biomanufacturing, pharmaceutical research and development, bioremediation, food science, and others.

### Competitive Advantage

First of its kind device allows for gentle and well-controlled physical and chemical manipulation to reduce or remove shear forces and prevent DNA breakage during transplantation. Robust monitoring (e.g., long-term time resolved imaging with ability to track individual cells and genomes and their interactions). Compatible with scale-up.




*Microfluidic device shows cell and genome confinement, imaging, manipulation without shear forces causing DNA breakage, and potential for scale-up. Example of controlled cell and DNA loading, real time imaging, and controlled entropic crowding by infusion of microfluidic device with poly-ethyl-glycol (PEG) chemical agent.*

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