CLAIMS:

1. A method for introducing foreign nucleic acids into cells, comprising:

placing the cells and nucleic acids in an acoustophoretic device comprising:

an acoustic chamber in which the cells and the nucleic acids are placed; and

an ultrasonic transducer including a piezoelectric material that can be driven to create an acoustic standing wave in the acoustic chamber; and

driving the ultrasonic transducer to create the multi-dimensional acoustic standing wave;

wherein at least the cells are retained by the acoustic standing wave, the nucleic acids being co-located with the cells to permit introduction of the foreign nucleic acids into the cells.

2. The method of claim 1, wherein the nucleic acids are in a viral vector.

3. The method of claim 1, further comprising opening pores in cell membranes of the cells prior to co-locating the cells with the nucleic acids.

4. The method of claim 3, wherein the pores are opened by electroporation, sonoporation, or by exposure to calcium phosphate.

5. The method of claim 1, wherein the acoustophoretic device further comprises a recirculation loop coupled to the acoustic chamber; and one or more of the cells or the nucleic acids are recirculated through the acoustic chamber.

6. The method of claim 1, wherein the cells are Chinese hamster ovary (CHO) cells, NS0 hybridoma cells, baby hamster kidney (BHK) cells, human cells, regulatory T-cells, helper T-cells, cytotoxic T-cells, memory T-cells, effector T-cells, gamma delta T-cells, Jurkat T-cells, CAR-T cells, B cells, or NK cells, peripheral blood mononuclear cells (PBMCs), algae, plant cells, or bacteria.

7. The method of claim 1, wherein the acoustic standing wave is a multi-dimensional acoustic standing wave, a planar standing wave, or a combination of a multi-dimensional acoustic standing wave and a planar standing wave.

8. The method of claim 1, wherein the ultrasonic transducer is driven at a frequency of about 0.5 MHz to about 20 MHz.

9. The method of claim 1, wherein the frequency of the acoustic standing wave is varied in a sweep pattern to move the cells relative to the nucleic acids.

10. A method for causing transduction of cells, comprising:

placing the cells and a viral vector comprising nucleic acids in an acoustophoretic device comprising:

an acoustic chamber in which the cells and the viral vector are placed; and

an ultrasonic transducer including a piezoelectric material that can be driven to create an acoustic standing wave in the acoustic chamber; and

driving the ultrasonic transducer to create the multi-dimensional acoustic standing wave;

wherein the cells and the viral vector are co-located by the acoustic standing wave to permit transduction of the cells.

11. The method of claim 10, wherein the cells and the viral vector are suspended in a fluid.

12. The method of claim 10, wherein the cells are Chinese hamster ovary (CHO) cells, NS0 hybridoma cells, baby hamster kidney (BHK) cells, human cells, regulatory T-cells, helper T-cells, cytotoxic T-cells, memory T-cells, effector T-cells, gamma delta T-cells, Jurkat T-cells, CAR-T cells, B cells, or NK cells, peripheral blood mononuclear cells (PBMCs), algae, plant cells, or bacteria.

13. The method of claim 10, wherein the acoustophoretic device further comprises a recirculation loop coupled to the acoustic chamber; and one or more of the cells or the nucleic acids are recirculated through the acoustic chamber.

14. The method of claim 10, wherein the ultrasonic transducer is driven at a frequency of about 0.5 MHz to about 20 MHz.

15. The method of claim 10, wherein the frequency of the acoustic standing wave is varied in a sweep pattern to move the cells relative to the viral vector.

16. A method for causing transfection of cells, comprising:

opening pores in cell membranes of the cells;

placing the cells and nucleic acids in an acoustophoretic device comprising:

an acoustic chamber in which the cells and the nucleic acids are placed; and

an ultrasonic transducer including a piezoelectric material that can be driven to create an acoustic standing wave in the acoustic chamber; and

driving the ultrasonic transducer to create the acoustic standing wave;

wherein the cells and the nucleic acids are co-located by the acoustic standing wave to cause transfection of the cells.

17. The method of claim 16, wherein the pores are opened by electroporation, sonoporation, or by exposure to calcium phosphate.

18. The method of claim 16, wherein the pores are opened before or after the cells are placed in the acoustophoretic device.

19. The method of claim 16, wherein the acoustophoretic device further comprises a recirculation loop coupled to the acoustic chamber; and one or more of the cells or the nucleic acids are recirculated through the acoustic chamber.

20. The method of claim 16, wherein the cells are Chinese hamster ovary (CHO) cells, NS0 hybridoma cells, baby hamster kidney (BHK) cells, human cells,

regulatory T-cells, helper T-cells, cytotoxic T-cells, memory T-cells, effector T-cells, gamma delta T-cells, Jurkat T-cells, CAR-T cells, B cells, or NK cells, peripheral blood mononuclear cells (PBMCs), algae, plant cells, or bacteria.

21. The method of claim 16, wherein the acoustic standing wave is a multi-dimensional acoustic standing wave, a planar standing wave, or a combination of a multi-dimensional acoustic standing wave and a planar standing wave.

22. The method of claim 16, wherein the ultrasonic transducer is driven at a frequency of about 0.5 MHz to about 20 MHz.

23. The method of claim 16, wherein the frequency of the acoustic standing wave is varied in a sweep pattern to move the cells relative to the nucleic acids.

24. The cells produced by the method of claim 1.

25. The cells produced by the method of claim 10.

26. The cells produced by the method of claim 16.