CLAIMS

What is claimed is:

1. A device comprising:

a substrate platform;

a base plate having a plurality of serpentine arms, the base plate attached to the substrate platform via the plurality of serpentine arms, the base plate provided on a plane in a resting position; and

a sharp member disposed on the base plate, the sharp member disposed perpendicular to the plane,

wherein the base plate and the substrate platform are co-planar at a resting position, and

wherein the base plate is configured to move in a direction perpendicular to the plane away from the resting position.

2. The device of claim 1, wherein the base plate comprises two serpentine arms that extend outwards from the base plate and are disposed radially evenly spaced from each other.

3. The device of claim 1, wherein the serpentine arms have a linear length at least two times a separation distance between the base plate and the substrate platform.

4. The device of claim 1, wherein the base plate and the substrate platform are concentric.

5. The device of claim 1, wherein the base plate has a shape consisting of circular disc, oval, square, rectangle, pentagon, or hexagon.

6. The device of claim 1, wherein the base plate has a lateral dimension between 100 nm and 10 cm.

7. The device of claim 1, wherein the base plate moves from the resting position for a distance between 0.1 nm and 10 mm.

8. The device of claim 1, wherein the base plate has a first thickness and the substrate platform has a second thickness.

9. The device of claim 1, wherein at least one of the base plate or the substrate platform comprises one of single crystal silicon, polycrystalline silicon, nanocrystalline silicon, amorphous silicon, or hydrogenated amorphous silicon.

10. The device of claim 1, wherein at least one of the base plate or the substrate platform has a doping concentration between 10^{10} atoms/cm^3 and 10^{21} atoms/cm^3.

11. The device of claim 1, wherein at least one of the base plate or the substrate platform has a resistivity value between 10^{-4} Ω-cm and 10^{4} Ω-cm.

12. The device of claim 1, wherein an electrical impedance across the base plate and the substrate platform is between 10^{2} Ω and 10^{12} Ω.

13. The device of claim 1, wherein the sharp member has a length between 50 nm and 1 mm.

14. The device of claim 1, further comprising a plurality of sharp members disposed on the base plate up to 500,000,000 sharp members.

15. The device of claim 1, wherein the base plate is an electrode, the device further comprising:

a counter-electrode disposed parallel to the electrode.

16. The device of claim 15, wherein the electrode and the counter-electrode are configured to receive an electric potential difference (V_o) between 0.1 μV and 10 kV.

17. A device comprising:

a substrate platform;

a base plate electrode having a plurality of serpentine arms,

wherein the base plate electrode is attached to the substrate platform via the plurality of serpentine arms,

wherein the base plate electrode provided on a plane in a resting position, and

wherein the base plate electrode and the substrate platform are co-planar at a resting position; and

a counter-electrode disposed parallel to, and non-coplanar with, the base plate electrode;

wherein the base plate electrode is configured to move in a direction perpendicular to the plane away from the resting position when a potential difference is applied between the base plate electrode and the counter-electrode.