

CLAIMS

1. A device, comprising:
first and second electrodes separated from one another by a space;
a particle coupled to the first electrode via a first plurality of bonds, and coupled to the second electrode via a second plurality of bonds; and
a polymerase coupled to the particle.
2. The device of claim 1, wherein the particle forms at least part of an electrically conductive bridge between the first and second electrodes.
3. The device of claim 1, wherein the particle is electrically nonconductive.
4. The device of claim 1, wherein the particle comprises a polymer having a tertiary structure.
5. The device of claim 4, wherein the polymer having the tertiary structure comprises a polynucleotide or a polypeptide.
6. The device of claim 5, wherein the polynucleotide or polypeptide is folded and cross-linked into a tertiary structure having a central constriction, the central constriction forming part of an electrically conductive bridge between the first and second electrodes.
7. The device of claim 1, wherein the particle comprises a nanoparticle with functional groups bonding the nanoparticle to the first and second electrodes.
8. The device of claim 7, wherein the nanoparticle is inorganic.
9. The device of any one of claims 1 to 8, wherein the particle has a diameter of at least about 10% of a length of the space.
10. The device of any one of claims 1 to 9, wherein the particle comprises a pair of nanoparticles coupled to one another by a linker.

11. A method of making a device, comprising:
depositing a solution onto first and second electrodes separated from one another,
the solution comprising particles in a liquid, each particle coupled to a respective
polymerase;
transporting one of the particles from the solution to a space adjacent to the first and
second electrodes; and
bonding the one of the particles to each of the first and second electrodes.
12. The method of claim 11, wherein the transporting comprises dielectrophoretically or
magnetically trapping the one of the particles at the first and second electrodes.
13. The method of any one of claims 11 to 12, wherein the bonding comprises forming
the first plurality of bonds between the first electrode and the one of the particles, and
forming the second plurality of bonds between the second electrode and the one of the
particles.
14. The method of any one of claims 11 to 13, further comprising sterically excluding,
using the one of the particles, other particles from the space adjacent to the first and second
electrodes.
15. The method of any one of claims 11 to 14, wherein the particle forms at least part of
an electrically conductive bridge between the first and second electrodes.
16. The method of any one of claims 11 to 14, wherein the particle is electrically
nonconductive.
17. The method of any one of claims 11 to 14, wherein the particle comprises a polymer
having a tertiary structure.
18. The method of claim 17, wherein the polymer having the tertiary structure comprises
a polynucleotide or a polypeptide.

19. The method of claim 18, wherein the polynucleotide or polypeptide is folded and cross-linked into a tertiary structure having a central constriction, the central constriction forming part of an electrically conductive bridge between the first and second electrodes.
20. The method of any one of claims 11 to 14, wherein the particle comprises a nanoparticle with functional groups bonding the nanoparticle to the first and second electrodes.
21. The method of claim 20, wherein the nanoparticle is inorganic.
22. The method of any one of claims 11 to 21, wherein the particle has a diameter of at least about 10% of a length of the space.
23. A device array, comprising:
a solid substrate;
a plurality of electrode pairs disposed on the solid substrate, the electrodes of each electrode pair being separated from one another by a respective space;
a plurality of particles, each bonded to the electrodes of a respective electrode pair,
wherein a majority of the electrode pairs respectively are bonded to a single one of the particles; and
a plurality of polymerases, each polymerase being coupled to a respective one of the particles.
24. A composition, comprising:
first and second electrodes separated from one another by a space;
a particle coupled to the first electrode via a first plurality of bonds, and coupled to the second electrode via a second plurality of bonds; and
first and second polynucleotides;
a plurality of nucleotides, each nucleotide being coupled to a corresponding label; and
a polymerase coupled to the particle and to add the nucleotides to the first polynucleotide using at least a sequence of the second polynucleotide; and
detection circuitry to detect a sequence of the addition of the nucleotides to the first polynucleotide using at least changes in a current between the first and second electrodes, the changes being responsive to the labels corresponding to those nucleotides.

25. A method for sequencing, the method comprising:
- adding, using a polymerase, nucleotides to a first polynucleotide using at least a sequence of a second polynucleotide;
 - changing, using labels respectively coupled to the nucleotides, a current between first and second electrodes, wherein a particle is coupled to the first electrode via a first plurality of bonds and is coupled to the second electrode via a second plurality of bonds; and
 - detecting a sequence in which the polymerase adds the nucleotides to the first polynucleotide using at least changes in the current that are caused using the labels corresponding to those nucleotides.