

We claim:

1. A microfluidic chip with reduced particle position dependency in a channel comprising:

at least three pairs of electrodes (4, 6, 7, 8, 9, 10) fabricated on non-
conducting bottom and top surface of the chip (2 and 3);

connecting means (4) for connecting measurement electrodes (5 and 6),
signal electrodes (7 and 8) and ground electrodes (9 and 10);

wherein the ground electrodes (9 and 10) are placed in the middle of the
measurement electrodes (5 and 6) and the signal electrodes (7 and 8); and
spacing between the measurement electrodes and the ground electrodes is
greater than 30 micron.

2. The microfluidic chip as claimed in claim 1, wherein a
photoimageable adhesive layer (11) is provided on the bottom surface (2)
for fabricating a channel of height between 25-32 micron for bonding
between top and bottom surface (2 and 3).

3. The microfluidic chip as claimed in claim 1, wherein the channel
has a venturi cross-section having a sensing region located in throat part
of the venturi.

4. The microfluidic chip as claimed in claim 1, wherein the bottom
surface of the chip is made of a non-conducting material; wherein the
non-conducting material is silicon dioxide or silicon nitride coated silicon
wafer.

5. The microfluidic chip as claimed in claim 1, wherein the top
surface of the chip is made of a transparent non-conducting material;
wherein the transparent non-conducting material is glass wafer.

6. The microfluidic chip as claimed in claim 1, wherein the channel
has a height of 27-32 micron and is patterned on adhesive layer of the
bottom surface.

7. The microfluidic chip as claimed in claim 1, wherein the electrodes are made of multilayered stack of tantalum, chromium, platinum and gold.
- 5 8. The microfluidic chip as claimed in claim 1, wherein the electrodes on the bottom surface are made of multilayer stack of tantalum, platinum and gold having individual layer thickness of 20 nm, 150 nm and 50 nm respectively.
- 10 9. The microfluidic chip as claimed in claim 1, wherein the electrodes on the top surface are made of multilayer stack of chromium, platinum and gold having individual layer thickness of 50 nanometer, 150 nanometer and 50 nanometer respectively.
- 15 10. A process for reducing particle position dependency to a coefficient of variation (CV) less than 3% in a microfluidic channel of a microfluidic chip, the process comprising:
- providing top and bottom surfaces of the microfluidic chip with at least three pairs of electrodes (4, 6, 7, 8, 9, 10);
- wherein the ground electrodes (9 and 10) are placed in the middle of the measurement electrodes (5 and 6) and signal electrodes (7 and 8); and spacing between the measurement electrodes and the ground electrodes is
- 20 greater than 30 micron.
11. The process for reducing the particle position dependency as claimed in claim 10, wherein the microfluidic channel with photoimageable, biocompatible and chemical resist adhesives is fabricated at low temperature ($<120^{\circ}\text{C}$) and at low pressure ($<100\text{N}$).
- 25 12. The process for reducing the particle position dependency as claimed in claim 10, wherein height and width of the microfluidic channel is optimized to reduce blockage by suspended clustered-particles and to reduce particle velocity inside higher cross section of said channel.

13. The process for reducing the particle position dependency as claimed in claim 10, wherein density of the suspended particles is matched to the density of a solution from 1000 to 1050 kg/m³; wherein conductivity of the solution is from 0.5 S/m to 2 S/m and flow rate is from 5 microliter / minute to 300 microliter/minute.
14. The process for reducing the particle position dependency as claimed in claim 10, wherein width of the venturi –cross-section channel containing sensing region is kept at as low as 40-50 micron to lower down pressure drop by incoming individual particles suspended therein.
15. The process for reducing the particle position dependency as claimed in claim 10, wherein the electrodes are formed on the top and the bottom surfaces of chip by liftoff process using UV photolithography technique.
16. The process for reducing the particle position dependency as claimed in claim 10, wherein multilayer stack for electrodes is formed by sputter deposition process.