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Optical Alignment Deformation Spectroscopy

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Summary: A microfluidic devise and method for high-throughput measurement of cell deformation

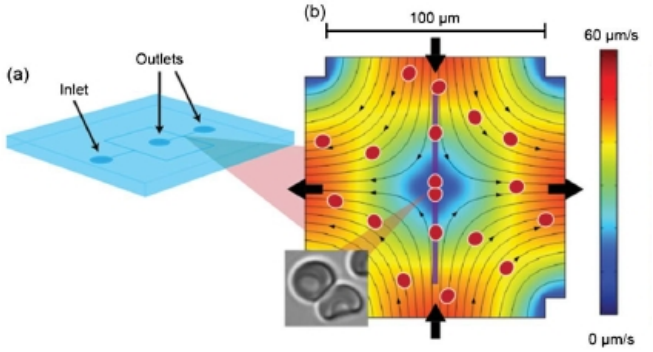
Description: Cell mechanical properties are a useful measure of phenotype that can be quantified by cell deformability. There is a lack of high-throughput methods to investigate the mechanical properties of large populations of individual cells. To address this need, researchers at Mines have developed optical alignment deformation spectroscopy (OADS), a technique where hydrodynamic interactions between individual cells are used to create deformation. In OADS, a linear optical trap is used to align two incoming cells in a microfluidic cross-flow geometry, allowing hydrodynamic forces to induce a collision between cells at the stagnation point. After the interaction, the cells leave the stagnation point and a new pair of cells enters the trap. A convenient model cell to characterize OADS is the human erythrocyte because of its well-known mechanical properties. Deformation data of erythrocytes is fit to a linear viscoelastic constitutive model (Voigt). The results show OADS has potential as an accurate, high-throughput, individual cell mechanical cytometer.

Main Advantages of this Invention:

- High through-put assay measuring individual cells instead of population average
- Reagent and label free
- More accurate than current methods

Potential Areas of Application:

- Disease screening
- High through-put blood testing method



Devise schematic and view of cross-junction, with cells entering and exiting

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Publications: K.B. Roth *et. al., Lab Chip* 2013, 13, 1571. (Available upon request.)

Intellectual Property Status: US utility patent pending (application #13/770,875)

Opportunity: We are seeking an exclusive or non-exclusive licensee for the manufacturing, marketing, and sale of this technology.

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