

Label-free High-throughput Multi-physical Cell Cytometer




Health & Wellness

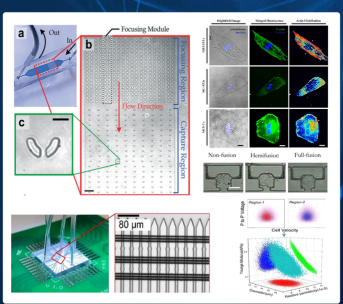
Biomedical and Genetic Engineering

Label-free High-throughput Multiparametric Cell Cytometer

- Label-free multi-dimensional biophysical cell phenotyping and Isolation,
- Mechatronic-based nuclear transfection,
- Hydrodynamic-based Cell fusion.



Conceptual Design



Remarks

48th International
Exhibition of Inventions
Geneva (IEIG) (2023) -
Gold Medal

IP Status

Patent filed



Opportunity

Cell physical properties, including size, shape, elastic modulus, cytoplasmic viscosity, and electric permittivity, are determined by the intracellular structures and molecular compositions. Cell physical properties can be label-free and non-invasive biomarkers, as they vary upon some diseases and the underlying pathological molecular alterations in the involved cells. For examples, cell elastic modulus are well known to be related to malignancy and invasiveness of tumor cells and immunological state of immune cells. It has also been demonstrated that the electric permittivity reflects intercellular communication, cell adhesion, and nutrient absorption. Mechanical and electrical properties exhibit cell phenotypes in different aspects. Multiparametric phenotyping of individual cells for both mechanical and electrical properties can achieve a more promising prognostic/diagnostic strategy.

Technology

The proposed system utilized a label-free multi-physical single-cell phenotyping technique. Using artificial intelligence to resolve the signal acquired from electrodes embedded under the microchannel, it can quantify uncoupled geometric (cell size), mechanical (elastic modulus) and electrical (dielectric constant) properties of each cell flowing in a microfluidic device, at a throughput comparable to the commercial flow cytometry.

The proposed system can be used for many aspects, such as cell phenotyping, cell sorting, fast diagnosis, liquid biopsy, etc.

Technology Readiness
Level (TRL) ?

4

Inventor(s)

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Develop
Concept

Proof
Concept

Follow-on

Build Value

Advantages

- Label-free
- Camera-free
- High-throughput

Applications

- Flow Cytometer
- Cell sorting
- Drug screening
- Drug delivery
- Liquid biopsy

