Label-free High-throughput Multi-physical Cell Cytometer

Health & Wellness

Biomedical and Genetic Engineering/Chemical Products

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

Technology Readiness Level (TRL) ❓   4

Inventor(s)
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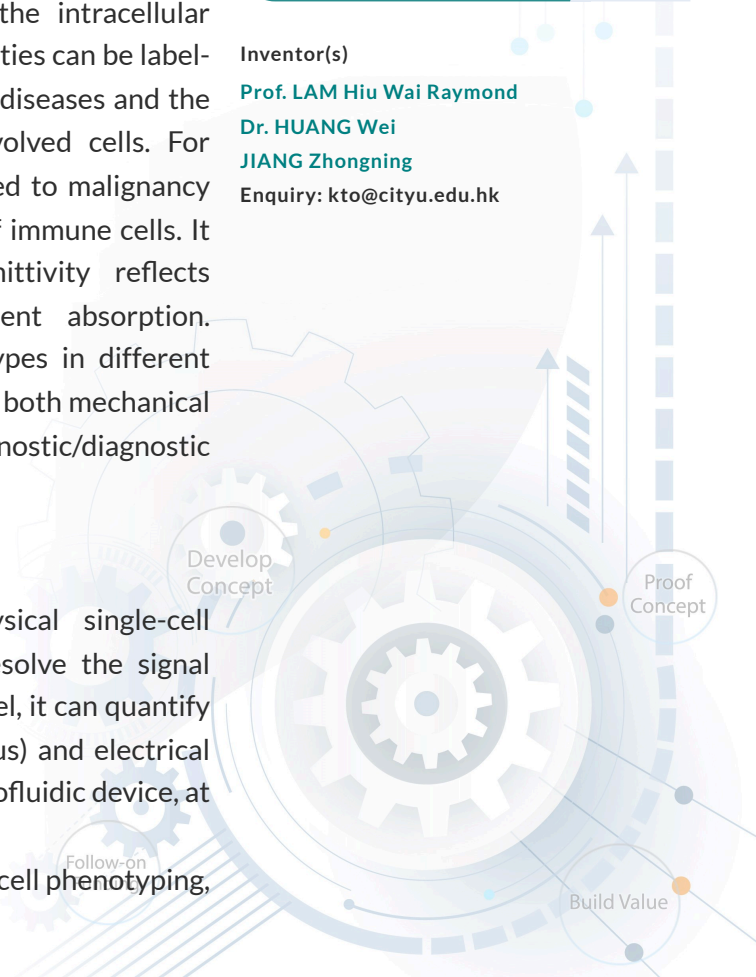**JIANG Zhongning**
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Opportunity

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.

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

Develop Concept

Proof Concept

Follow-on Funding

Build Value