Various Apparatus for Cell and Particle Separation and Its Method

Dr. Sunghwan Chang
Department of Nano Manufacturing Technology
T. +82 – 42 – 868 – 7793
E. schang@kimm.re.kr

Various methods of platform technology for separating cells or target particles by size and property and the ways of application

Client / Market

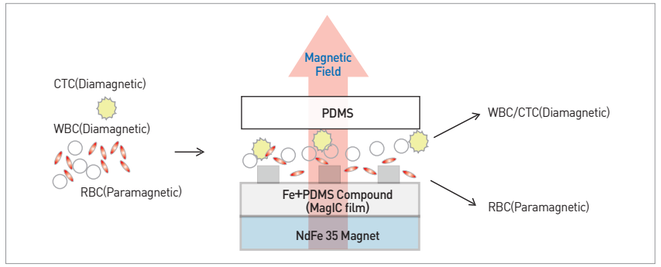
- Liquid biopsy or blood–based cancer diagnosis
- Hemocyte separation and analysis
- Blood plasma separation for biosensor

Necessity of this Technology

- Effective cell and particle separation is possible by using a different separation method depending on the blood sample amount, treatment time, purpose of use before and after separation.
- The clinical blood cell and plasma separation method separates the cell by putting the blood and the solution with a different density inside the centrifugal separator; however, this works well for separating a large amount of sample, but it is difficult to separate the target cell from a small sample.
- Various cell and particle separation methods have been developed to solve this problem.
- Typically, there are methods for separating cells by magnetic force by binding a biomarker and magnetic particles to a target cell, a method for measuring the physical properties (size, deformability, density, electrical / magnetic properties, etc.).
- However, the individual techniques proposed to solve the above problems are difficult to be used in accordance with the amount of various samples, the processing speed, the purpose of use before and after the separation, and mainly used for the lab–on–a–chip platform.

Technical Differentiation

- This technology provides the lab–on–a–chip platform as well as cell and particle separation platforms that utilize membrane, tube and various sample sizes, treatment speeds, and interfaces.
- Also, according to the purpose of cell separation, it offers continuous separation, and phased separation using the filter and frequency process in order to provide various cell and particle separation solutions that cannot be handled with individual technologies.



DESIRED PARTNERSHIP

Technology Transfer | Licensing | Joint Research | Other

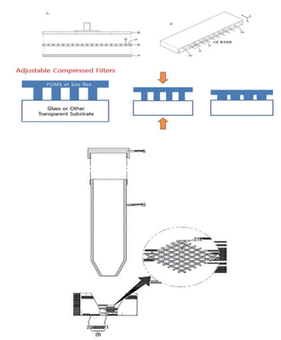
TECHNOLOGY READINESS LEVEL [TRL]

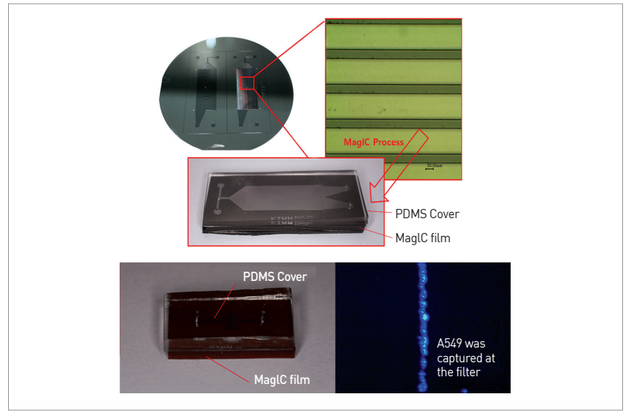
Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/ evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch

- Distinctiveness of detailed technology
  - Cell separation using magnetism: Form a local magnetic field inside the microchannel using a complex containing ferromagnetic particles to separate cells by magnetic properties.
  - Self cell extraction using magnetic field: Create a filter with a complex containing ferromagnetic particles and use outer magnetic field to generate a local magnetic field within the filter. Through this, increase the cell filtering effect or extract cells of larger size caught in the filter (e.g. CTC, circulating tumor cells).
  - Target cell capturing filter: A filter with a bypass channel to prevent large cells from getting caught in the filter and block. The filter is designed so that the filter with larger cells blocking the channel due to the flow resistance will be avoided by other cells.
  - Target cell capturing filter apparatus: A filter apparatus that solves the issue of larger cells getting caught in the filter to block and disturb collection. The filter is made with flexible material, and the filter width is narrowed while pressure is being applied to filter the cells, and then the cells are collected after the pressurization stops.
  - Target cell capturing filter device: A filter device that includes a temperature sensing layer, where the solubility changes as it reacts to the temperature, between the filter that after the cells are filtered, the temperature is changed to collect the cells caught in the filter.
  - Target cell counting tube: Unlike general centrifugal separating tube, the cell counting tube has a cap with a grid on the bottom for cell counting. It can separate the particles and count them at the same time.
  - Target particle detecting membrane filter: A new concept membrane filter that has the cell filtering effect monitoring benefit using microchannel of the lab–on–a–chip and the fast treatment speed benefit of the membrane.

Excellence of Technology

Target Cell Capturing Filter and Counting Tube





Current Intellectual Property Right Status

PATENT

- Apparatus for Separating Cells Using Magnetic Force and Method for Separating Cells Using the Same (KR1212030, US13 / 546187)
- Apparatus for Self–Extracting Cells Using Magnetic Force and Method for Self–Extracting Cells Using the Same (KR1211862, US13 / 546106, EP12176073.0, JP5512754)
- Filter for Capturing Target Cells and Collecting Method of Using the Same (KR1690455)
- Filtering Equipment for Capturing Target Cells and Collecting Method of Using the Same (KR1697457)
- Filtering Device for Capturing Target Cells and Collecting Method of Using the Same (KR1712770)
- Tube for Target Cells Counting and Target Cell Counting Method Using the Same (KR1776536)