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Industrial Consultancy & Sponsored Research (IC&SR)

IMPROVED LAB-ON-CHIP DEVICES AND METHODS OF RECYCLING FLUIDS USING ELECTRO KINETICS

IITM Technology Available for Licensing

Problem Statement

- Generally, **integrated microfluidic device** process fluids of extremely small size components and the sample fluid analyzed inside the device by moving the fluid one direction to other direction.
- The fluid flow in the micro-channel arise from an applied pressure difference or electro osmosis. And in pressure driven flows, the pressure at inlet is higher than that the outlet.
- The **residence of time** of the sample is **important**, and there is **high demand** of development of microfluidic device in increase the residence time.
- Hence, the present patent literature provides the solution to address the above issues.

Technology Category/ Market

Chemical Engineering: Micro-fluidic device or lab-on-chip device;
Industry: Chemical Plants, Pharmaceutical Industry;
Applications: Pharmaceuticals, Biomedical and chemical sciences
Market: The market of **Lab-on-Chip device** is projected to reach **USD 9.15**Billion by **2030** at a **CAGR** of **8.97%**.

Technology

- Present invention describes about **a microfluidic device** to **increase the residence time** in the lab-on-chip devices and **reuse** expensive chemicals and raw materials.
- The substrate is adapted to receive an electric field in the recycle channel **to reverse the flow of the fluid** thereby increasing the residence time of the fluid.
- The recycle flow is initiated once the applied electric field reaches **beyond its critical value**.
- Present invention talks about a microfluidic device and a method of recycling fluid in micro-fluidic device.
- The microfluidic device comprises a few elements mentioned hereinbelow:

1. **A substrate including two parallel channels for fluid communication, wherein first channel with an inlet to receive a fluid and an outlet to exit the fluid;**
2. **A pump coupled to the inlet of the first channel to create pressure difference between inlet and exit and determine direction of the flow of the fluid in the channels;**
3. **The second channel is adapted to receive an electric field by means of electrodes to reverse the flow of the fluid and increase residence time;**

- The method of recycling fluid in micro-fluidic device comprising the steps of a) receiving sample fluid in the first channel; b)applying an electric field sufficient to reverse the flow of the fluid in the second channel.

Intellectual Property

IITM IDF Ref. 1422;
IN Patent No. 421221 (Granted)

TRL (Technology Readiness Level)

TRL- 3, Proof of Concept Ready Stage

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Key Features / Value Proposition

❖ ***Technical Perspective:***

1. A **microfluidic device** facilitates the **increased residence time** in the lab-on-chip devices and **reuse expensive chemicals** and **raw materials**.
2. The device includes a substrate which may be any glass including P-type silicon and N-type silicon.

3. Said fluid may be a polar compound or an electrolyte solution and the pump is a syringe pump disclosed in the invention disclosure.

❖ ***Industrial Perspective:***

1. Lab-on-chip or micro microfluidic device is **compact in size and economic**, easy **portable**, having **increased residence time.**

Images

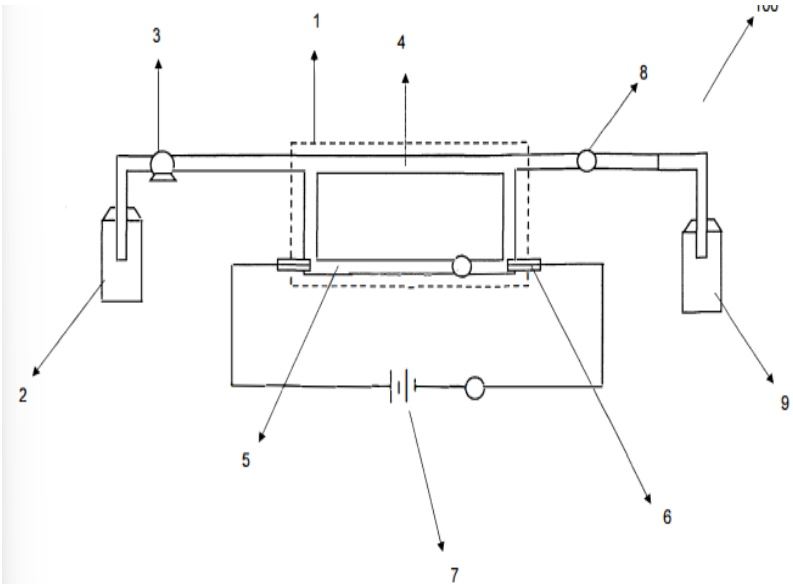

FIG.1: Illustrates as claimed microfluidic device

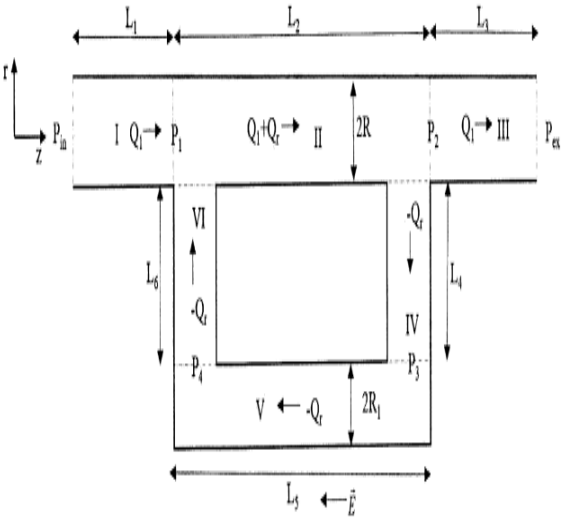

FIG.2: Illustrates working of microfluidic device

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