METHOD FOR BLOOD PLASMA SEPARATION BASED ON ACOUSTOCAPILLARY AND ASYMMETRIC CAPILLARY FLOW

IITM Technology Available for Licensing

Problem Statement

- Generally, there is major interest to generate high quality plasma from whole blood in many biomedical analysis & clinical diagnostic methods.
- In conventional method of centrifuge-based separation of plasma, there is commonly needs milliliters of blood & a **labor-intensive** handling process in addition to the **bulky apparatus,** which makes the process **difficult & unsustainable** for regular tests & thus sample pre-treatment step becomes **a bottleneck** of the assay process.
- Hence, there is a need to address above issues in efficient manner.

Technology Category/ Market

Technology: Microfluidic Device;
Industry: Pharmaceutical, Medical device;
Application: Medical Test Equipment;
Market: The global **microfluidic device** market is projected to reach **$158.1B** by **2031**, at a **CAGR** of **22.4%** during (2023-**2031**)

Technology

- Present invention describes **a microfluidic device for separation of plasma from blood cells**.
- Said Patent further discloses a **method for blood plasma separation** using microfluidic device based **on acoustocapillary and asymmetric capillary flow.**
- Said **microfluidic device** comprises a **polydimethylsiloxane (PDMS) microchannel layer** bonded with a **PDMS coated glass** thereby making the glass walls hydrophilic slide and the bottom wall of the microchannel is hydrophobic.
- The **acoustic radiation force** on the blood cells act towards the center of the channel or node makes blood cells to concentrate at the center of the channel & cell-free plasma at the-walls or anti-node and the acoustic waves propagate in the width wise direction which makes the cells to move in the y direction.
- The **method** for **blood plasma separation** using microfluidic device is illustrated in below smart chart & figures:

1→ **Introducing a blood sample in an inlet to enter into the microchannel through capillary action;**

2→ **Creating an acoustic standing wave by PZT transducer in the microchannel;**

3→ **Detecting the separated plasma from blood using a detection mode;**

4→ **Finally collecting the separated plasma from detection module through the outlet.**

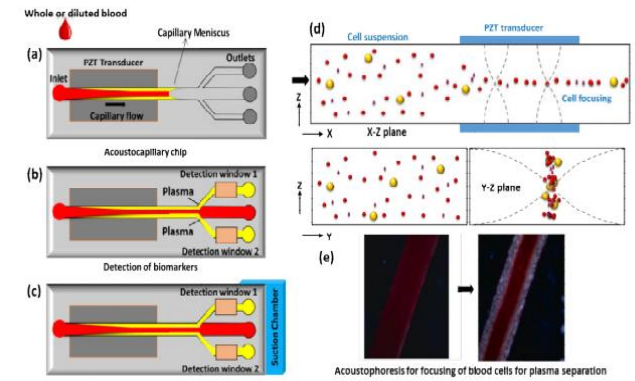

Fig 1

Intellectual Property

IITM IDF Ref. 1385; Patent No:410407;

TRL (Technology Readiness Level)

TRL-3, Proof of concept tested in Lab;

Research Lab

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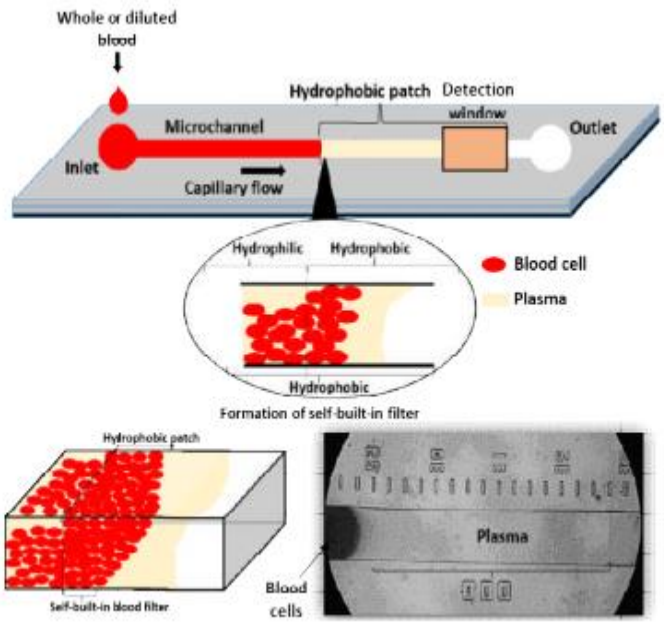
Key Features / Value Proposition

❖ ***Technical Perspective & Industrial Perspective***:

- Present invention facilitates **simple diagnostic process cum handy device** including features like **improvised quality**, **reproducibility & reliability** of the assay results. (Refer Fig.1 illustrates acousto-capillary based blood plasma separation process.)
- Provides a capillary driven blood plasma separation device designed both in **horizontal configuration & vertical configuration.**
- **Enabled realization of a lab on chip diagnostic platform.**
- The cell-free plasma at the walls can be separated from the blood cells using a **trifurcated channel configuration &** separated plasma can be collected at the **outlets for** further analysis or detection**.**
- A **suction chamber** can also be used to **control fluid flow** along with the **capillary flow**.
- **Cost-effective & time-consuming process.**

Image



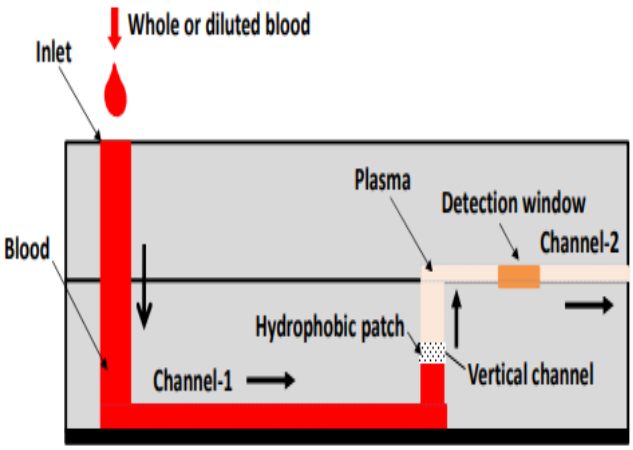


FIGURE 3

Fig. 2 : Illustrates asymmetric capillary flow based blood plasma separation in horizontal configuration.

Fig. 3: Illustrates asymmetric capillary flow-based blood plasma separation in vertical configuration.

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