



Computation analysis on different meander shaped microfluidic channel for separating various biomolecules

Praveen Kumar S

Department of Electronics and Communication Engineering, Saveetha Engineering College, Chennai, Tamilnadu, India

Abstract:

In this modern era, people are facing many health issues due to various reasons and that can be detected by analyzing the blood. Blood has different components like RBC, WBC, platelets and plasma. When the human is facing health issue, they can observe change in the quantity of any of these constituents. Hence, analyzing the blood molecules will pave way to diagnose the disease well in advance. Conventionally, or even today, people used to approach the test centres to examine their health condition which leads to following uncomformness such as taking large volume of blood, travelling to the test centre, waiting for longer time for getting result, high cost, etc. This opens the way for newer approach for testing the blood constituents in the home itself. This work investigated the meander shaped microfluidic channel for separating various biomolecules based on its size. Different geometries of meander microchannel with symmetric and asymmetric shapes are analyzed computationally in COMSOL multiphysics software. Properties of the blood such as density (1025 Kg/m^3) and dynamic viscosity ($3.5 \times 10^{-4} \text{ Pa.s}$) were provided as input to the software, examined its flow and uniformity for various input flow rates, optimized and found out that the microchannel having $250 \mu\text{m}$ is showing uniform flow rate over the entire microchannel length for the input flow rate of 0.2 ml/min with controlled fluid flow at the bends where the trapping holes can be formed. Also, particle tracing computation is performed from which the microchannel's trapping efficiency is computed to be 90 %. The optimized design can be used for filtering various sized biomolecules.

Biography:

S Praveen Kumar has completed his PhD at the age of 33 years from Anna University. He is the head of Centre for Micro Nano Design and fabrication (CMNDF) research centre, Saveetha Engineering College, Chennai, Tamilnadu, India. He has published more than 20 papers in reputed journals and presented his work in more than 15 international conferences.



He is guiding 5 PhD students and he has been serving as an reviewer in various international journals. His specialization includes MEMS, Microfluidics, Biofilter, Electrochemical methods, etc.

Recent Publications:

1. Praveen kumar, S, Ramesh, R & Aravind, T 2016, 'Isolation and detection of Low density lipoprotein using porous silicon based array of cantilever', International Journal of Printing, Packaging & Allied Sciences, vol. 4, pp. 2488-2497.
2. Praveen kumar, S, Ramesh, R & Aravind, T 2016, 'Analysis of Different Size Microchannel through Particle Tracing for Biomolecule Separation', Journal of Computational and Theoretical Nanoscience (Annexure I).
3. Praveen kumar, S, Ramesh, R & Aravind, T, 'Porous based immunosensor for detection of LDL molecules from blood serum using array of cantilever beam', Journal of advances in chemistry.
4. Praveen kumar, S, Ramesh, R & Aravind, T 2017, 'Study on Different Meander Structured Microchannel: A Biofilter', Biomedical Research, Allied Academics Journals. (Annexure I)
5. Praveen kumar, S, Ramesh, R & Aravind, T, 'Silicon based biofilter for biomolecule separation', Biomedical research, Allied Academics Journals, (Annexure I).

4th International Microfluidics Congress; March 25-26, 2020; Las Vegas, USA

Citation: Praveen Kumar S; Computation analysis on different meander shaped microfluidic channel for separating various biomolecules; Microfluidics 2020; March 25-26, 2020; Las Vegas, USA