

I-STEM Software Request - Guide Approval Form

User Details

- Name of Researcher : TRIPARNA MAITRA
- User Type : ☐ Ph.D. Scholar ☐ Postdoctoral Researcher ☒ Bachelor's ☒ Master's
- Institution Name : VELLORE INSTITUTE OF TECHNOLOGY (VIT), VELLORE
- Institutional Contact No. : _____
- Research Topic : Design and fabrication of a microfluidic cell-sorting platform for menstrual blood cells.

Software Request Details

- Software Name : COMSOL Multiphysics® 6.0

- Justification for Software Request:

The primary aim of this work is to develop and optimize a microfluidic device for efficient isolation and sorting of menstrual blood-derived stem cells for biomedical and diagnostic applications. Computational modeling is essential to predict device performance, optimize sorting efficiency, and validate design parameters before fabrication.

The research requires accurate numerical simulation of microfluidic flow dynamics, particle trajectories, and cell-separation mechanisms. Core simulations involve coupled multiphysics analysis including laminar flow dynamics to model cell movement through microfluidic channels, particle tracing to predict cell trajectories and sorting paths based on size and physical properties, and fluid-structure interactions to understand how cell deformation affects sorting behaviour. Additionally, the study investigates how variations in flow rate, channel geometry, and cell properties influence separation efficiency. Temperature-dependent viscosity effects may also be studied to optimize storage and handling conditions for cell viability.

Such coupled multiphysics simulations are reliably supported by COMSOL 6.0, making it essential for achieving the research objectives.

Guide/Supervisor Approval

I, Subhathirai SP (Guide/Supervisor Name),

- Confirm that the above-mentioned researcher is affiliated with our institution
- Have reviewed the software request and its relevance to the researcher's academic work
- Approve the software request for research purposes

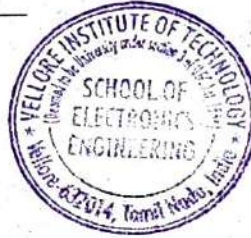
Approval Confirmation

- I approve the software request
- The software aligns with the researcher's research objectives
- The request meets the institutional research guidelines

Guide/Supervisor Signature : Subhathirai SP

Date : 18/09/2026

Official Stamp/Seal :



From

Triparna Maitra
M.Tech. Biomedical Engineering
Department of Sensor and Biomedical Technology
School of Electronics Engineering (SENSE)
Vellore Institute of Technology (VIT), Vellore
Katpadi
Tamil Nadu – 632014

To

Dr. Subhathirai S P
Assistant Professor Sr. Grade 1
Department of Sensor and Biomedical Technology
School of Electronics Engineering (SENSE)
Vellore Institute of Technology (VIT), Vellore
Katpadi
Tamil Nadu – 632014

Subject: Justification for COMSOL Multiphysics® 6.0 Software request through I-STEM

Respected madam,

I am writing to request access to COMSOL Multiphysics® version 6.0 through the I-STEM facility to support my ongoing research project titled "Design and Fabrication of a Microfluidic Cell Sorting Platform for Menstrual Blood Cells." The primary objective of this work is to develop and optimize a microfluidic device for efficient isolation and sorting of menstrual blood-derived stem cells for biomedical and diagnostic applications. Computational modeling is essential to predict device performance, optimize sorting efficiency, and validate design parameters before fabrication.

The research requires accurate numerical simulation of microfluidic flow dynamics, particle trajectories, and cell separation mechanisms. Core simulations involve coupled multiphysics analysis including laminar flow dynamics to model cell movement through microfluidic channels, particle tracing to predict cell trajectories and sorting paths based on size and physical properties, and fluid-structure interactions to understand how cell deformation affects sorting behavior. Additionally, the study investigates how variations in flow rate, channel geometry, and cell properties influence separation efficiency. Temperature-dependent viscosity effects may also be studied to optimize storage and handling conditions for cell viability.

Such coupled multiphysics simulations are reliably supported by COMSOL 6.0, making it essential for achieving the research objectives. The software's capability to handle complex geometries, couple multiple physics domains, and provide detailed visualization of flow fields and particle paths will significantly accelerate device optimization and improve design decisions. I kindly request approval for access to this software through I-STEM.

Thanking you,

Yours sincerely,

Triparna Maitra (Reg. no.: 25MBE0004)

Guide's signature (with date):  18/09/2026