I-STEM Software Request - Guide Approval Form

User Details

- **Name of Researcher:** RAMYA G K
- **User Type:** [✓] Ph.D. Scholar [ ] Postdoctoral Researcher [ ] Bachelor's [ ] Masters
- **Institution Name** : VELLORE INSTITUTE OF TECHNOLOGY
- **Institutional Contact No:** +91- 416-2243091/93
- **Research Topic:** MICROFLUIDICS

Software Request Details

- **Software Name:** COMSOL 6.0
- **Justification for Software Request:** [Provide detailed explanation of how the software supports your research objectives]

Guide/Supervisor Approval

I, Dr. Subhathiraj S.P (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: _____

Date: 19/12/2025

Official Stamp/Seal: [Space for Institutional Stamp]

VELLORE INSTITUTE OF TECHNOLOGY (Deemed to be University under section 3 of UGC Act, 1956) School of Electronics Engineering (SENSE) Vellore-632014, Tamil Nadu, India

Important Notes

1. This form must be signed and scanned
2. The scanned copy must be uploaded with the software request
3. Electronic signatures are acceptable if from an official institutional email

Justification for Requesting COMSOL Multiphysics® 6.0 Software

From

Ramya G K,
PhD Scholar,
School of Healthcare Science and Engineering,
Vellore Institute of Technology.

To

Dr. Subhathirai S P,
Assistant Professor Sr. Grade 1,
School of Electronics Engineering,
Vellore Institute of Technology.

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

Respected Madam,

I would like to request access to COMSOL Multiphysics® version 6.0 through the I-STEM facility to support my ongoing research project, in which one of the objectives is focused on the design, simulation, and optimization of microfluidic systems for the synthesis of nanoemulsions intended for drug delivery applications. In this context, computational modeling is employed as a critical tool to complement experimental development. The primary objective of this work is to understand and predict the mixing behavior, interfacial dynamics, and droplet formation mechanisms that govern nanoemulsion formation inside microfluidic geometries. Experimental investigation of such systems is often time-consuming and limited in understanding the interfacial phenomena at the microscale; therefore, a robust multiphysics simulation platform is essential.

The study requires accurate modeling of microfluidic geometries and coupling of multiple physics interfaces. Core simulations involve laminar flow and two-phase flow to capture oil–water interface dynamics, along with transport of diluted species to study surfactant diffusion and interaction. These are essential to predict droplet breakup and nanoemulsion formation. In addition, the effects of temperature and electric fields on droplet generation will be investigated. The Heat Transfer Module is required to study temperature-dependent viscosity and interfacial tension, while the AC/DC module enables analysis of electrohydrodynamic effects and electric-field-assisted emulsification.

Such coupled multiphysics simulations are reliably supported in COMSOL 6.0, making it essential for achieving the objectives of this research. I kindly request approval for access to this software.

Yours Sincerely,
Ramya G K.

VELLORE INSTITUTE OF TECHNOLOGY
School of Electronics Engineering (SENSE)
Vellore-632014, Tamil Nadu, India

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Dr. Subhathirai S.P