Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

Project Proposal for Ph.D.

SIRe Project Number

2025-01-13

(will be assigned by SIRe)

Project Details	
Project Title	In situ Glass Dissolution Studies with AI-Driven Atomic Force Microscopy
Project Summary (Minimum 500 and maximum 2000 characters)	This project integrates large language model (LLM) agents with atomic force microscopy (AFM) to automate the study of glass dissolution mechanisms at the nanoscale. By developing an autonomous experimental system where LLMs analyze real-time AFM data, identify dissolution patterns, and dynamically adjust experimental parameters, we aim to uncover previously unobservable dissolution kinetics and surface interactions. The AI-driven approach will enable continuous monitoring over extended timeframes, automatic feature recognition across complex glass compositions, and correlation of nanoscale observations with macroscale dissolution behavior—ultimately accelerating materials development for applications ranging from nuclear waste immobilization to bioactive glasses for medical implants and more durable architectural materials.

Ph.D. Supervisors

Role	Name of Faculty	Date of Superannuation (DD/MM/YYYY)	Academic Unit in IITD/Institute/University	Email ID (Official) & Contact Number
Supervisor 1	N. M. Anoop Krishnan	31/03/2053	Department of Civil Engineering, Yardi School of Artificial Intelligence	krishnan@iitd.ac.in
Supervisor 2	Nitya Nand Gosvami	30/04/2045	Department of Materials Science and Engineering	ngosvami@iitd.ac.in

Project requirements (Student qualifications, experience required, etc)
***The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)**

- B.Tech. with a valid GATE score or M.Tech. in Civil/Mechanical/Electrical/Materials Science/Computer Science or allied disciplines or M.Sc. in physics or chemisty with CSIR/JRF or other equivalent degree.
- Candidates with prior experience in machine learning related projects is preferred.
- Candidates with background in materials/physics is preferred.

Source of fellowship/funding
(CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

Candidate with his/her own fellowship / Project fellowship

Role of Faculty Members involved:	
Supervisor-1	Glasses, LLMs
Supervisor-2	Atomic force microscopy