Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

SIRe Project Number

2025-01-02

(will be assigned by SIRe)

Project Proposal for Ph.D.

Project Details	
Project Title	Functional and Analytical Characterization of Biotech Therapeutic Products
Project Summary (Minimum 500 and maximum 2000 characters)	Biotherapeutic products are complex in nature. A typical biotherapeutic may have as many as 20-30 critical quality attributes (CQAs) that are relevant to its safety and efficacy. Characterization of these CQAs is hence a non-trivial task. While functional characterization focuses on understanding the structure-function relationship of the product, analytical characterization involves using multiple, orthogonal, high resolution analytical tools to fingerprint the product. This project will entail development of cutting edge approaches that enable rapid, accurate characterization of biotherapeutic products. Specifically, the student will be responsible for performing the following activities: 1. Higher order structure will be evaluated by circular dichroism (CD), fluorescence, and Fourier transform infrared (FTIR) spectroscopy. 2. Size heterogeneity will be examined by size exclusion-high performance liquid chromatography (SE-HPLC). 3. Charge heterogeneity with or without carboxypeptidase B (CpB) digestion will be assessed by cation exchange-high performance liquid chromatography (CEX-HPLC). 4. Biological characterization will be performed using in-vitro and receptor binding assays. As the scope of this project is inter-disciplinary in nature, spanning skills from analytical to functional characterization, the admittance of the student would be best suited under the SIRe scheme. The resources required to successfully carry out research in the host lab would be made available to the admitted student along with appropriate training.

Ph.D. Supervisors

Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Anurag S. Rathore	Chemical Engineering	asrathore@biotechcmz.com
Supervisor 2	Anita Roy	KSBS	anita.roy@bioschool.iitd.ac.in

Project requirements (Student qualifications, experience required, etc)

Qualification:
B Tech/ BS in biotechnology or biochemistry or related discipline (1st division)
MS/M Sc/ M Tech in biotechnology or microbiology or related discipline (1st division)

Experience required (Mandatory skills)

1. Experience in handling complex proteins such as monoclonal antibodies
2. Expertise in analytical bioseparation techniques (Ion-exchange chromatography, Reverse-phase chromatography, size exclusion chromatography)
3. More than 2 years of industry experience

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

Project Funding

Role of Faculty Members involved:

Supervisors: Prof. Anurag. S. Rathore – Analytical characterization
Co-Supervisor: Prof. Anita Roy – Functional characterization