Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

SIRe Project Number

2022-01-14

(will be assigned by SIRe)

PhD Project

Project Details	
Project Title	Development of microbial derived biopolymers for tissue engineering applications
Project Summary	(Bio)polymers serve as important scaffolds in tissue engineering applications. They promote growth of cells and support tissue formation. Some of the properties of biopolymers that need to be tailored to tissue engineering applications include enhancing biocompatibility, tensile strength and water retention. Traditionally, chemically synthesized (bio)polymers have been employed in tissue engineering applications. Chemical synthesis require harsh chemical synthesis and treatment techniques for processing. More recently, efforts have focused on the use of naturally derived biopolymers with microbially synthesized biopolymers providing a promising avenue for their production. This proposal aims to explore microbially derived biopolymers for use in tissue engineering applications including bacterially derived cellulose and polyhydroxybutyrate. Initially, microbial strains will be screened for their capacity for producing biopolymers. Growth conditions will be optimized for improving titers of the product along-side use of microbial metabolic engineering strategies. Parallelly, the biopolymers will be characterized for their properties such as tensile strength. Additionally, the effect of growth conditions on the self-assembly of these biopolymers leading to different morphologies will be investigated. They will further be embedded on supports and studied for their properties to promote cell growth under various conditions.

PhD Supervisors

Role	**Faculty**	**Academic Unit in IITD**	**Email ID**
Supervisor 1	Dr. Ashish Misra	DBEB	ashishmisra@iitd.ac.in
Supervisor 2	Dr. Neetu Singh	Biomedical Engineering	sneetu@cbme.iitd.ac.in
Supervisor 3	Dr. Shyam Kumar Masakapalli	IIT Mandi	shyam@iitmandi.ac.in

Project requirements (Student qualifications, experience required, etc)

- B. Tech or M. Tech in Biotechnology/Chemistry/Biomedical Engineering with experience in microbial and mammalian cell culture AND/OR polymer characterization

Source of funding (IRD/FITT Project details, if any)

Sponsored (JRF/SRF, Industry) or Part-time candidate (no full-time funding available with the PI's)

Role of Faculty Members involved:

The supervisors have expertise in the following areas relevant for the project.
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Supervisor 1: Bioprocessing and microbial engineering
Supervisor 2: Design of biomaterials for tissue engineering applications
Supervisor 3: Microbial derived chemicals and phytochemicals

Supervisor 1 and 3 will guide the selection of microbes for biopolymer production and optimization of growth and culturing conditions. Supervisor 2 will guide the use of the biopolymers and their investigation for tissue engineering applications. The complementary expertise of the supervisors is critical for the project.