



Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)	
Project Title	Design and Fabrication of Textile-Based Bio monitoring Sensors and Therapeutic Devices Using Plasma Technology for Healthcare Applications
Project Summary (Minimum 500 and maximum 2000 characters)	The growing demand for wearable healthcare systems has accelerated research in smart textiles and electronic textiles (e-textiles) for continuous and non-invasive health monitoring. Currently, most e-textile fabrication processes rely on conventional chemical treatments and coating techniques, which involve hazardous chemicals, high water consumption, and environmental pollution. To overcome these limitations, plasma-assisted surface engineering and plasma sputtering technologies have emerged as sustainable and efficient alternatives for functionalizing sisal and bamboo fabrics. Plasma processing enables the deposition of conductive and multifunctional coatings on natural fibre fabrics without compromising their flexibility, comfort, and eco-friendly nature. The proposed work aims to design and fabricate sisal and bamboo fabric-based biomonitoring sensors and therapeutic devices using DC/RF plasma processing technology that would be suitable for healthcare applications. The novelty of the proposal lies in combining sustainable sisal and bamboo fabrics with plasma technology to develop eco-friendly smart healthcare textiles. The proposed research is expected to contribute towards advanced wearable healthcare systems, sustainable technical textiles, green electronics, remote patient monitoring, and indigenous development of smart healthcare technologies.

Ph.D. Supervisors* (Supervisor 1 and Supervisor 2 cannot be from the same department of IITD)				
Role	Name of Faculty	Date of Superannuation\$ (DD/MM/YYYY)	Academic Unit in IITD/Institute/University	Email ID (Official) & Contact Number
Supervisor 1*	Ramesh Narayanan	30/04/2040	Department of Energy Science and Engineering, Indian Institute of Technology Delhi	rams@dese.iitd.ac.in
Supervisor 2	Dr. Bornali Sarma	31/12/2034	CSIR-NIScPR, AcSIR	Drbornali.sarma@csir.res.in

*Supervisor 1 must be from IIT, Delhi.

+All cells in this table are mandatory fields that need to be filled by faculty for consideration of proposal.

\$The date of superannuation of supervisors should be at least three years from the date of registration of selected candidates.

Project requirements (Student qualifications, experience required, etc) *The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)
- M.Sc. in Material Science / Polymer Science / Physics, Environment B. Tech. / M. Tech. Textile Engineering / Chemical Engineering / Material Science and Engineering/ Engineering Physics / Environmental Engineering - Knowledge of programming Matlab/Python and/or software tools may get preference

Source of fellowship/funding and project number (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
CSIR/UGC/JEST/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE or any other national / international scholarships or with government/non-government sponsorships can apply (preferable) If not, then Institute Fellowship (FIA) can be considered (if slot available).

Role of Faculty Members involved:	
Supervisor-1	Prof. Ramesh Narayanan (DESE, IIT Delhi) will mentor the student in - Operating the plasma discharge systems - Understanding the experimental procedure of collecting data - Understanding experimental parameters/boundary conditions for characterization
Supervisor-2	Dr. Bornali Sarma will mentor the student in - Development of optimal plasma processes for functionalizing sisal and bamboo fabrics - Develop eco-friendly smart healthcare textiles.

Note :-

- 1. Approval from the respective DRC/CRC/ScRC of your Department/Centre/School will be required for using the "Full-time Institute Assistantship (Category-wise) (FIA)" for selecting the students in SIRe.**
- 2. Declaration:- Faculty members, please ensure that you have at least 3 years of service left before superannuation along with adequate sitting space & lab facilities for the SIRe student.**
- 3. PI/s are also encouraged to submit joint proposals with AIIMS, NII, JNU and institutes with which IITD has an existing MoU. If the Co-PI (Supervisor 2) is from outside IITD, kindly share his/her detailed CV.**
- 4. If a research scholar is to be considered for selection under the project fellowship, then the project should have a minimum of two-year duration remaining.**
- 5. A candidate applying with a valid JRF/INSPIRE/any national level fellowship should have at least two-year validity from the date of joining the Ph.D. program.**
- 6. The third supervisor's name (if required) can be added only after the formation of Student Research Committee (SRC) subject to a strong recommendation of SRC and subsequent approval from the competent authority.**
- 7. If institute fellowship is being sought then the DRC approval of the parent departments of both supervisors is required at the time of selection.**