



Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)	
Project Title	Plasma-based processing to develop noise control materials from waste
Project Summary (Minimum 500 and maximum 2000 characters)	Waste, be it solid, liquid, plastic, or e-waste, has become a major environmental and health hazard, with governments finding it increasingly difficult to manage and dispose of accumulated waste through conventional approaches such as incineration or gasification. However, the emphasis has gradually shifted towards addressing waste at its source by encouraging society to follow the multiple R's of waste management. Repurposing waste is an important aspect of this approach, wherein discarded materials can be converted into useful products. At the same time, increasing urbanization, industrialization, and transportation activities have made noise pollution another significant environmental and health concern, creating a growing need for effective and sustainable acoustic materials for noise control applications. In this context, plasma-based processes have been regarded as environmentally friendly methods for modifying material surfaces. This proposal aims to use plasma discharges to modify specific properties of various waste materials, followed by appropriate mechanical processing to develop acoustic materials. The effects of plasma modification and subsequent processing will be investigated through the characterization of surface, physiochemical, morphological, and mechanical properties, with particular emphasis on material characteristics influencing acoustic performance. The developed materials will also be evaluated for their acoustic properties to establish relationships between material properties and acoustic performance. The student will be expected to master the plasma processing of waste materials, material characterization, and subsequently develop a product with practical applications in noise control.

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	S. Fatima	30/11/2052	Center for Automotive Research and Tribology (CART), Indian Institute of Technology Delhi	fatima@iitd.ac.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. Mechanical 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	Prof. S. Fatima (CART, IIT Delhi) will mentor the student in - Development of noise control materials from waste - Understanding the characterization of the developed materials - Implementation of the developed material for noise control applications.

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.**