



Project Proposal for Ph.D.

Project Details

Project Title	Long-lasting antibacterial and cytocompatible coatings on polymeric surfaces to prevent biomaterial associated infection
Project Summary (Minimum 500 and maximum 2000 characters)	Biomaterials associated infections caused by pathogenic bacteria are one of the major leading clinical issues, prevention and/or treatment of which still remain a challenging task. Long lasting, non-leaching infection resistant antimicrobial coatings with impressive cytocompatibility offer a step towards addressing this problem. In this particular proposal, we would like to implement a novel strategy for constructing highly antibacterial as well as cytocompatible mixed polymer brushes onto polymeric surface irrespective of the nature of polymers, i.e., on the surface of both biodegradables such as PLA, PCL etc. and non-degradable polymeric surface like PE, PP, PU etc. The mixed brushes are proposed to be a combination of poly(3-dimethyl-(methacryloyloxyethyl) ammonium propane sulfonate) and poly((oligo ethylene glycol) methyl ether methacrylate) with varying chain length of ethylene glycol unit. Creation of hydroxyl groups on the polymeric surface via PLASMA treatments and converting them to ATRP initiating moiety have been planned, that will be exploited to grow polymeric mixed brush using SIATRP. The newly created surface will be evaluated for their bacterial efficacy against both various pathogens for prolonged period of time. Moreover, the cytocompatibility of mixed brush modified surfaces will also be assessed, since antibacterial surfaces usually suffer from cytotoxicity. Soft, hydrophilic and neutral zwitterionic brushes may completely suppress the bacterial growth without compromising its cytocompatibility. An added advantage will be the creation of anti-infective brushes on 'any' polymeric surface owing to the versatile nature of PLASMA treatment process, thus broadening the scope of polymeric biomaterials for widespread applications ranging from implants to biomedical devices.

Ph.D. Supervisors

Role	Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Prof. Sampa Saha	DMSE	ssaha@mse.iitd.ac.in
Supervisor 2	Prof. Hariprasad P.	CRDT	phari@rdat.iitd.ac.in

Project requirements (Student qualifications, experience required, etc)

- Master in Chemistry (Preferred)
- MTech. in Polymer science/Rubber Technology/Chemical Engineering
- UGC/CSIR qualified candidate will be preferred.

Source of fellowship/funding

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

ICMR funded project (RP04441G)

Role of Faculty Members involved:

Prof. Sampa Saha (PI for the project) will supervise the selected student on polymeric materials development work and Prof. Hariprasad P. will co-supervise the student on antibacterial/biological performance evaluation part of the newly developed materials.