



Project Proposal for Ph.D.

Project Details	
Project Title	Development of environmentally friendly greases using vegetable oil(s)
Project Summary (Minimum 500 and maximum 2000 characters)	The present market of commercial grease is dominated by petroleum/mineral oils-based greases which contain harmful chemicals, thickeners, and additives. Such greases are hazardous to the environmental health during their service life and even after being discarded as a waste. Literature suggests that a few eco-friendly alternatives (from natural and/or eco-friendly ingredients) have been developed; however, a potential solution is still awaited. The present study is a step towards the development of clean greases using soyabean oil as base oil, organo-montmorillonite as thickener and calcium carbonate nanoparticles, biopolymers like gum acacia (GA) and guar gum (GG) as additives. The use of natural deep eutectic solvents (NADES) derived from plants for developing greases/gels. Further, one of the main focuses of this work will be to explore the use of used oil (cooking oil) for grease (gel) development. The developed greases will be characterized for fundamental properties (consistency, thixotropy and rheology) and benchmarked with an equivalent commercial grease to justify the signatures of a typical lubricating grease. Deep exploration of the microstructures will also be carried out to understand the mechanism(s) behind the observations.

Ph.D. Supervisors			
Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Deepak Kumar	Centre for Automotive Research and Tribology (CART)	dkumar@iitd.ac.in
Supervisor 2	Pravin P. Ingole	Department of Chemistry	ppingole@iitd.ac.in

Project requirements (Student qualifications, experience required, etc) *The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)
A student with M.Sc./M.Tech. in Chemistry, Physics, and B.Tech./M.Tech. Chemical Engineering, Materials Science and Engineering, Polymer Science and Engineering.

Source of fellowship/funding (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
Candidate with his/her own fellowship /institute assistantship

Role of Faculty Members involved:	
Supervisor-1	Mechanical and tribological evaluation of the developed greases or gels.
Supervisor-2	Chemical evaluation of the fresh and degraded vegetable oils along with developed greases or gels.