Dr. Santanu Chattopadhyay

Professor, Rubber Technology Centre,
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Academic Qualification

Sl. No.	Degree	Year	Subject	University/Institution	CGPA
1	**Master of Science**	1995	Chemistry	Indian Institute of Technology Kharagpur, India	**8.2/10**
2	**Master of Technology**	1997	Materials Science and Engineering	Indian Institute of Technology Mumbai, India	**9.4/10**
3	**Doctor of Philosophy**	2001	Rubber Technology Centre	Indian Institute of Technology, Kharagpur, India.	--

PhD Thesis Details:

Thesis Title: "Development and Properties of Electron Beam Modified Thermoplastic Elastomeric Polyolefin Blends"

Supervisors: Professor Anil Kumar Bhowmick & Professor Tapan Kumar Chaki, Rubber Technology Centre, Indian Institute of Technology Kharagpur.

Post-Doctoral Experience:

S. No	Name of Award	Awarding Agency	Year
1	Post-Doctoral Fellow	The University of Western Ontario, London, Ontario, Canada	**2001-2002**
2	Post-Doctoral Research Associate	Georgia Institute of Technology, Atlanta,GA, USA.	2002-2004

Work Experience:

S.No.	Positions Held	Name of the Institute	From	To
1	**VisitingFaculty**	Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2004	**2007**
2	**Asst. Professor**	Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2007	**2011**
3	**AssociateProfessor**	Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2011	**2018**
4	**Professor**	Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2018	**Present**
5.	**Head of the Centre**	Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2019	**2022**
6.	**Associate Dean, Students' Affairs**	Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2023	**2025**
7.	**Chairman, Hall Management Centre**	Indian Institute of Technology Kharagpur, Kharagpur, WB, India	2025	**Present**

Technological Experience:

Compression Molding, Dynamic Mechanical Analyzer (2980, TA Instruments), X-Ray Diffraction (PW- 1840, X-ray diffractometer), FESEM (Philips XL30 S FEG, Netherland), Scanning Probe Microscope (XE-100(PSIA), Monsanto Rheometer (Monsanto Rheometer R- 100), Differential Scanning Calorimeter (NETZSCH DSC 200 PC, Germany), Thermo Gravimetric Analyzer (TG Analyzer, NETZSCH, TG 209, F1, Germany), Tensile Testing Machine (Hounsfield H10KS), Mixing Mill (6"×12" and 14"×36"), Extruder (hot feed 8" rubber extruder and twin screw extruder), Rubber Process Analyzer (RPA), Gel permeation chromatography (GPC), Atomic force microscopy (AFM), Capillary Rheometer, Flexometer, DIN abrader and Du-Pont abrader for rubber wear measurement.

Research Interest:

- Science & Technology of rubber and rubber-like materials.
- Engineering Design with Rubber.
- Rheology and Rubber process engineering.
- Finite element analysis, Computational fluid dynamics, and Molecular dynamic simulation of polymeric materials.
- Drug delivery and biomaterials.
- Cancer diagnosis and therapeutics.

Supervision:

- Research Scholar (Ph.D., completed): 32
- Research Scholar (Ph.D., Ongoing): 12
- Post-Doctoral Research Fellow: 1
- M.Tech. Students: 70+

Membership of Professional Bodies:

- Member: Materials Manufacturing Ontario (Ontario, Canada).
- Life: Society for Polymer Science, India.
- Member (membership no. 93241963): IEEE Engineering in Medicine and Biology.
- Editorial board member: Journal of Advanced Biotechnology and Bioengineering.
- BoS member of CUSAT, Kerela, and Midnapore College, WB.
- Member of the R&D committee of The Rubber Board, India.

Honors and awards:

- Editorial Board member of Journal of Advanced Biotechnology and Bioengineering February 2018-December 2021
- Editorial Board member of Scientific reports, Nature.
- Appointed as the Board of members of NRC Kolkata, Oct 2018
- RULA AWARDS for International Innovation and Betterment and Excellence award in Technical Research as "Outstanding Young Scientist in Bio-materials", 12 Nov 2018.
- Best Paper Award on “Simulation of Extrusion Dies for Rubber Profiles” at 23rd Rubber Conference 2018 by IRMRA, Mumbai.
- Japan Society for the Promotion of Science (JSPS) Fellow, 2023
- Faculty Excellence Award, IIT Khaagpur-2023.

Patents:

- S. Kumar, G. B. Nando, S. Nair, G. Unnikrishnan, A. Sreejesh, and S. Chattopadhyay, “Bromobutyl Rubber (BIIR) and Polyepichlorohydrin Rubber (ECH) Blend Nanocomposites (Indian Patent Application No: 1428/KOL/2013), filing date December 18, (2014).
- J. C. Meredith, J. L. Sormana, and S. Chattopadhyay, “Organically modified reactive nanocomposites for engineering thermoset polymers and elastomers, US Patent provisional application, USPT ID 3624, 2006.
- S.K. Ghorai, A. Dutta, S. Dhara, and S. Chattopadhyay, “Metal augmented surface engineered bio-fabricated scaffolds for critical bone defects” Indian Patent application No. 202331045098 dated 05-07-2023.
- R. Hore, D. Ganguly, A. Bera, and S. Chattopadhyay, “A Ceramic Wastes Incorporated Rubber Composite for the Vibration Isolator Application in Electrical Vehicles” Indian Patent application No. 202331044406 dated 03-07-2023.

Book and Book Chapters:

- M. Selvakumar, G. B. Nando and S. Chattopadhyay, “Thermoset-clay Nanocomposites: An Overview”, Advances in Polymer Materials and Technology, CRC Press, Boca Raton, USA, (2016).
- U. Basuli, S. Panja, T.K. Chaki and S. Chattopadhyay, “Preparation and Properties of Nanocomposites Based on Poly(Ethylene-Co-Methyl Acrylate) and Multi-walled Carbon Nanotubes "-Technological Advancement in polymer nanocomposites of carbon nanotubes: Processing Performance and Applications, published by Springer, (2015).
- O.P Bajpai, S. Panja, S. Chattopadhyay, D.K. Setua, “Process–structure-property relationships in nanocomposites based on piezoelectric-polymer matrix and magnetic nanoparticles”- Manufacturing of Nanocomposites with Engineering Plastics, Elsevier, (2015).
- S. Chatterjee, A.K. Chandra, and S. Chattopadhyay, “Elastomers based Bio- nanocomposites”-Recent Advances in Elastomers”, Volume-II, Springer, (2011)
- A. Dutta, T. Roy, P.G. Ray, R. Rajasekaran, M. Banerjee, S. Chattopadhyay, S. Gupta, and S. Dhara,, “3D Printing: Challenges and Its Prospect in Futuristic Tissue Engineering Applications” in 3D Printing in Biomedical Engineering, Materials Horizons: From Nature to Nanomaterials Springer (2020).
- D. Ganguly and S. Chattopadhyay, “Plastics in self-healing applications” - Plastics and Polymers, Elsevier, (2021).
- A. Guchait, A. Saxena, and S. Chattopadhyay, and T. Mondal, “Conjugated Polymers in Bioelectronics in Conjugated polymers for next generation of photovoltaics, energy storage, and electronics”, Elsevier, (2021)
- S. K. Ghorai and S. Chattopadhyay, “Graphene-elastomer Composite for Biomedical Applications”, Elsevier, (2022)
- S. Hui, S. Chattopadhyay, “Recent developments of the radiation processed hybrid organic-inorganic polymer nanocomposites: expected and unexpected achievements, Applications of high energy radiations: synthesis and processing of polymeric materials, 239-278, Springer (2023).
- M. Goswami, S. Sharma, G. Subbarayan, S.P. Bordas, & S. Chattopadhyay, Historical purview and recent advances in fracture mechanics of elastomeric matrix composites. Advances in Applied Mechanics, 56,139-187, Elsevier.
- N Kumar, S Ghosh, P Maity, S Chattopadhyay, “Polymer nanoparticles” Reference Module in Materials Science Engineering, Elsevier (2024).
- Santanu Chattopadhay, Nikhil Kumar, Polymer Characterization: Structure to Applications, 1st Edition, Springer Nature, 2026, https://doi.org/10.1007/978-981-95-2609-3

Course Coordinated:

- NPTEL course “Characterization of Polymers Elastomers and Composites”
- NPTEL course “Rheology and Processing of Paints, Plastic, and Elastomer-Based Composites”
- NPTEL course “Foundation on Rubber Science, Technology and Manufacturing”
- 5th Research Scholars’ Day of Rubber Technology Centre, IIT Kharagpur, 6th April 2018 with Prof. N. K. Singha.
- Short Term Course On “Rubber Technology” at Rubber Technology Centre, IIT Kharagpur,

Articles:

Sl. No.	Title	Authors	Name of the issue	Year
1	The mystery of structural aspects of Natural Rubber and so is the dispersion of silica into NR	Bera A., Ganguly D., Amarnath SKP, Chattopadhyay S.	Rubber India- Nov 2022 Issue	2022
2	Multifunctional effect of natural gum on the properties of rubber compounds	Koley R., Chattopadhyay S., Bhowmick A. K.	Rubber India- Jan 2022 Issue	2022
3	Finite Element Method Based Damage Model for Elastomeric Composites used in Rubber Industries	Goswami M., Chattopadhyay S.	Rubber India- Aug 2021 Issue	2021
4	Fluroelastomer and Silicone Rubber Based Super speciality Blend applicable for Wide Temperature Range	Khanra S., Chattopadhyay S.	Rubber India - Sept 2021 Issue	2021
5	An Approach to Design Extrusion Dies for Complex Shaped Rubber Profiles Using Finite Element Analysis	Sharma S., Deb A., Chattopadhyay S.	Rubber India - Sept 2020 Issue	2020

Publications:

Sl. No.	Author(s)	Title	Name of Journal	Vol. (issue)	Pages	Year
211	Roumita Hore, Praveen Sreenivasan, Abhay Kumar, Soumen Giri, Pallab Banerji, Santanu Chattopadhyay	Development of an eco-friendly vibration isolator using slag and SiC-reinforced natural rubber composite for automotive application: An approach towards circular economy https://doi.org/10.1016/j.conbuildmat.2026.145222	Construction and Building Materials	509	145222	2026
210	Vaibhav Kumar Arya, Tuhin Saha, Debabrata Ganguly, Sambhu Bhadra, Sujith S Nair, Santanu Chattopadhyay	Effect of Different Accelerator Systems on the Processing, Mechanical, Dynamic, and Network Properties of Natural Rubber Vulcanizates https://doi.org/10.1002/pen.70181	Polymer Engineering & Science	66 (2)	703-715	2025
209	Aparajita Pal, Rajpal Singh Chauhan, Baidyanath Roy, Sayani Maiti, Sreeja	Design of ZIF-8-Reinforced Dynamically Cross-Linked Hydrogel Electrolyte for	ACS Applied Polymer Materials	7 (21)	15176-15193	2025

	Nath Chowdhury, Jasomati Nayak, Mythravaruni Pullela, Samit K Ray, Santanu Chattopadhyay, Narayan Ch Das	Robust and Flexible Supercapacitor Devices https://doi.org/10.1021/acsapm.5c03560				
208	Ramya Devi, Piyush Gupta, Chandra Khatua, Kinsuk Naskar, Santanu Chattopadhyay	Thermoplastic Polyurethane-Based Stimuli-Responsive Nanocomposites: A Review on Self-Healing and Shape Memory Properties https://doi.org/10.1002/pen.70073	Polymer Engineering & Science	65 (11)	5645-5668	2025
207	Santanu Chattopadhyay, Amaira Anand	A sustainable and cost-effective method for recycling vulcanized EPDM in automotive mat applications https://doi.org/10.1007/s10965-025-04502-0	Journal of Polymer Research	32 (8)	267	2025
206	Piyush Gupta, Santanu Chattopadhyay, Narayan Ch. Das	Short fiber reinforced elastomeric composites with enhanced mechanical and tribological properties for potential application in V-belts doi:10.3389/fmech.2025.1629780	Frontiers in Mechanical Engineering	11	-	2025
205	Ghorai, S. K., Dutta, A., Subramanian, B., Kumar, N., Dhara, S., Whitlock, P. W., & Chattopadhyay, S	Mussel-inspired surface engineering of 3D printed scaffolds employing bedecked transition metal for accelerated bone tissue regeneration https://doi.org/10.1016/j.bioadv.2025.214309	Biomaterials Advances	174	214309	2025
204	Mukundan, L. M., Rajasekaran, R., Das, S., Seesala, V. S., Ganguly, D., Kumar, N., & Chattopadhyay, S.	Tailoring of agarose hydrogel to modulate its 3D bioprintability and mechanical properties for stem cell mediated bone tissue engineering https://doi.org/10.1016/j.ijbiomac.2025.142795	International Journal of Biological Macromolecules	309	142795	2025
203	Ganguly, D., Goswami, D., Bera, A., Khatua, B. B., & Chattopadhyay, S.	Recycled Ferromagnetic Fillers Endow Excellent Magnetic Field Tunable Viscosity and Electromagnetic Radiation Shielding within Elastomer Composites	Advanced Engineering Materials	2402489	2402489	2025

		https://doi.org/10.1002/adem.202402489				
202	Guchait, A., Haridas CP, A., Chattopadhyay, S., Mondal, T.	Tannic Acid Modified Epoxidized Natural Rubber Based High Performing Triboelectric Nanogenerator https://doi.org/10.1002/smll.202411410	Small	24	11410	2025
201	Bera, A., Manna, B., Ghosh, A., Nanda, S., Chattopadhyay, S.	Advancing Green and Sustainable Approaches: Investigating the Impact of Carbohydrates on Silica-Filled Natural Rubber Composites https://doi.org/10.1002/pol.20241137	Journal of Polymer Science	63(6)	1453-1465	2025
200	Ghosh, S., Kumar, N., & Chattopadhyay, S	Electrically conductive "SMART" hydrogels for on-demand drug delivery https://doi.org/10.1016/j.ajps.2024.101007	Asian Journal of Pharmaceutical Sciences	101007		2024
199	Mukundan, L. M., Das, S., Rajasekaran, R., Ganguly, D., Seesala, V. S., Dhara, S., Chattopadhyay, S.	Photo-annealable agarose microgels for jammed microgel printing: Transforming thermogelling hydrogel to a functional bioink https://doi.org/10.1016/j.ijbiomac.2024.134550	International Journal of Biological Macromolecules,	278	134550	2024
198	Guchait, A., Pramanik, S., Goswami, D. K., Chattopadhyay, S., & Mondal, T.	Elastomeric Ionic Hydrogel-Based Flexible Moisture-Electric Generator for Next-Generation Wearable Electronics https://doi.org/10.1021/acsami.4c11907	ACS Applied Materials & Interfaces	16(35)	46844-46857	2024
197	Pal, A., Nayak, J., Roy, B., Maiti, S., Chowdhury, S. N., Das, P., Das, N. C.	Dual crosslinked interpenetrating polymer network-based porous hydrogel membrane for solid-state supercapacitor applications https://doi.org/10.1016/j.polymer.2024.127408	Polymer	308	127408	2024
196	Pandit, S., Kumar, S., Ganguly, D., Sardar, P., Nandi, S., Mandal, M., Das, R. K	Freeze–Thaw-Induced, Metal Ion Cross-Linked, Mechanically Robust, and Highly Stretchable Composite Poly (vinyl alcohol) Hydrogels for	ACS Applied Polymer Materials	6(13)	7631-7647	2024

		Flexible Electronic Applications https://doi.org/10.1021/acsapm.4c01108				
195	A. Bera, M. Yamano, S. Kawahara, S. Chattopadhyay	A step towards a green and sustainable method to understand the effect of glucose on a silica filled natural rubber composite https://doi.org/10.1039/D4MA00500G	Materials Advances	5 (18)	7264-7277	2024
194	LM Mukundan, S Das, R Rajasekaran, D Ganguly, VS Seesala, S Dhara, S Chattopadhyay	Photo-annealable agarose microgels for jammed microgel printing: Transforming thermogelling hydrogel to a functional bioink https://doi.org/10.1016/j.ijbiomac.2024.134550	International Journal of Biological Macromolecul-es	278 (1)	134550	2024
193	A. Guchait, S. Pramanik, D. K. Goswami, S. Chattopadhyay, T. Mondal	Elastomeric Ionic Hydrogel-Based Flexible Moisture-Electric Generator for Next-Generation Wearable Electronics https://doi.org/10.1021/acsami.4c11907	ACS Applied Materials & Interfaces	16 (35)	46844-46857	2024
192	N Kumar, S Ghosh, P Maity, S Chattopadhyay	Polymer nanoparticles https://doi.org/10.1016/B978-0-323-95486-0.00114-9	Reference Module in Materials Science Engineering			2024
191	S Das, AK Bhowmick, S Chattopadhyay	A Blocked Mercapto Silane Functionalized Silica Decorated Aramid Nanofiber to Evolve Elastomer/Silica Composite for Energy Efficient Tire https://doi.org/10.1002/pat.70001	Polymers for Advanced Technologies	35 (12)	70001	2024
190	M. Goswami, P. Gupta, Y. Lev, S. Chattopadhyay, K.Volokh	Multiaxial failure of dual-phase elastomeric composites https://doi.org/10.1016/j.engfracmech.2024.110625	Fracture Mechanics	312	110625	2024
189	Guchait, A., Sharma, S., Chattopadhyay, S., & Mondal, T	Synthesis of gallic acid-grafted epoxidized natural rubber and its role in self-healable flexible temperature sensors https://doi.org/10.1039/D3SM01367G	Soft Matter	20(1)	178-191	2024

188	Mukundan, L. M., Rajasekharan, R., Das, S., Seesala, V. S., Ganguly, D., Kumar, N. & Chattopadhyay, S	Modulation of Agarose Hydrogel Towards 3d Bioprinting Using Human Placenta Derived Msc-Laden Photo-Crosslinkable Bioink for Bone Tissue Engineering https://doi.org/10.1016/j.ijbiomac.2025.142795	Archive			2024
187	Bera, A., Sarkar, K., Ganguly, D., Ghorai, S.K., Hore, R., Kumar, N., Amarnath, S.K.P. and Chattopadhyay, S	Recent advancements in silica-filled natural rubber composite: A green approach to achieve smart properties in tyre https://doi.org/10.1007/s10965-024-03956-y	Journal of Polymer Research	31	122	2024
186	Das, S., Chattopadhyay, S., & Bhowmick, A. K	Glycidyl methacrylate as a non-silane modifier in rubber/silica composites. https://doi.org/10.5254/rct.23.76994	Rubber Chemistry and Technology	96(3)	277-306	2023
185	Goswami, M., Sharma, S., Roychowdhury, S., Bordas, S. P., & Chattopadhyay, S	Fracture of V-notched natural rubber composites used in heavy-duty tire tread https://doi.org/10.1016/j.engfailanal.2023.107358	Engineering Failure Analysis	150	107358	2023
184	Kumar, N., Ghosh, B., Kumar, A., Koley, R., Dhara, S., & Chattopadhyay	Multilayered “SMART” hydrogel systems for on-site drug delivery applications https://doi.org/10.1016/j.jddst.2022.104111	Journal of Drug Delivery Science and Technology	80	104111	2023
183	Sarkar, K., Khanra, S., Sharma, S., Ghorai, S. K., & Chattopadhyay, S	Self-assembled 3D-microstructured dual carbon black-filled polymer nanocomposite-coated fabric for tunable electromagnetic interference shielding https://doi.org/10.1080/00405000.2022.2026577	The Journal of The Textile Institute	114	207-216	2023
182	Hui, S., & Chattopadhyay, S	Recent Developments of the Radiation Processed Hybrid Organic-Inorganic Polymer Nanocomposites: Expected and Unexpected Achievements https://doi.org/10.1007/978-981-19-9048-9_8	Springer Nature Singapore		239-278	2023
181	Goswami, M., Sharma, S., Ghosh, M. M., Kröger, N. H., Berto, F.,	Finite element method-based damage model to characterize effect of geometric configuration on	Mechanics of Advanced Materials and Structures	30	2149-2163	2023

	Chakraborty, G., & Chattopadhyay, S	fracture properties of elastomeric composites https://doi.org/10.1080/15376494.2022.2051102				
180	Kumar, A., Shahin, M. B., Hossain, S. J., Chattopadhyay, S., & Gonzalez, M.	Mechanical characterization of filled elastomer nanocomposites under finite-deformation cyclic loading using yield-surface-free plasticity. https://doi.org/10.1016/j.compscitech.2023.110140	Composites Science and Technology	241	110140	2023
179	Sahoo, S., Basu, D., Kumar, A., Rasam, P., Koundal, A., Nawale, M., ... & Chattopadhyay, S.	Systematic evaluation of a sustainable plasticizer derived from coconut shell bio-waste in a reinforced styrene-butadiene copolymer system. https://doi.org/10.1007/s10965-023-03619-4	Journal of Polymer Research	30(6)	248	2023
178	Koley, R., Ghorai, U. K., Chattopadhyay, S., & Bhowmick, A. K.	An investigation on Moringa oleifera fruit (drumstick)-derived cellulose micro and nanofiber reinforced styrene butadiene rubber composites. https://doi.org/10.1002/pc.27279	Polymer Composites	44(5)	2778-2793	2023
177	Kumar, A., Basu, D., Sahoo, S., Khanra, S., Kumar, N., Gonzalez, M., & Chattopadhyay, S.	Green Approaches for Functionalized Silica-Based Natural Rubber Nanocomposites Using Eco-friendly Sodium Alginate Biopolymers for Superior Static and Dynamic Behaviors. https://doi.org/10.1021/acssuschemeng.2c06059	ACS Sustainable Chemistry & Engineering	11(18)	6866-6878	2023
176	Koley, R., Chattopadhyay, S., & Bhowmick, A. K.	Synthesis and properties of biophenol-furfural based bioresin for curing of styrene butadiene rubber. https://doi.org/10.1002/pen.26271	Polymer Engineering & Science	11(18)	6866-6878	2023
175	Prachishree Panda; Agniva Dutta; Sourabh Pal; Debabrata Ganguly; Santanu Chattopadhyay;	Strain sensing multi-stimuli responsive light emitting lanthanide-based tough and stretchable hydrogels with tunable luminescence and fast self-recovery using	New Journal of Chemistry	47	5734--5750	2023

	Narayan Chandra Das; Rajat K. Das	metal–ligand and hydrophobic interactions https://doi.org/10.1039/D2NJ05263F				
174	Agniva Ghosh, Prachishree Panda, Anish Das, Debabrata Ganguly, Santanu Chattopadhyay, Pallab Banerjee, Debabrata Pradhan and Rajat Kumar Das	Intrinsically Freezing Tolerant, Conductive and Adhesive Proton Donor-acceptor Hydrogel for Multifunctional Application https://doi.org/10.1021/acsapm.2c01285	ACS Applied Polymer Materials	4	7710-7722	2022
173	Abhijit Bera, Debabrata Ganguly, Roumita Hore, Jyoti Prakash Rath, S Ramakrishnan, Job Kuriakose, SKP Amarnath, Santanu Chattopadhyay	A feasible method of silica dispersion by introducing a pre-vulcanized gel in the natural rubber matrix https://doi.org/10.1007/s10965-023-03501-3	Journal of Polymer Research	30 (3)	124	2023
172	Lakshmi M. Mukundan, Hema Bora, Ragavi Rajasekaran, Santanu Dhara, and Santanu Chattopadhyay	Shell-sheddable antibiotic nanohybrid through drug-mediated surface-initiated polymerization: an overcoat approach for modulated burst release https://doi.org/10.1007/s10853-023-08206-y	Journal of Materials Science	54	3014-3116	2023
171	Abhijit Bera, Debabrata Ganguly, Jyoti Prakash Rath, S Ramakrishnan, Job Kuriakose, SKP Amarnath, Santanu Chattopadhyay	The effect of bio-based ingredients in isoprene rubber: A biomimetic approach to improve the dispersion of silica https://doi.org/10.1016/j.matchemphys.2022.127151	Materials Chemistry and Physics	295	127151	2023
170	Abhijit Bera, Mohit Goswami, Debabrata Ganguly, Jyoti Prakash Rath, S Ramakrishnan, Job Kuriakose, SKP Amarnath, Santanu Chattopadhyay	The variation of structure and property of sorbitol-treated NR vulcanizates with increasing the silica loading https://doi.org/10.1007/s10853-022-08092-w	Journal of Materials Science	56	996-1011	2023

169	D Goswami, G Potnis, S Chattopadhyay, J Das	Observation of a large magnetocaloric effect and suppressed transition in Ti doped Ni-Co-Mn-Sn ribbons upon annealing https://doi.org/10.1016/j.jallcom.2022.165490	Journal of Alloys and Compounds	917	165490	2022
168	Abhijit Bera, Bharat Manna, Debabrata Ganguly, S. K. P. Amarnath, Samik Nanda, Amit Ghosh and Santanu Chattopadhyay	Pre-treatment of Hevea latex by sorbitol: improving the efficacy of silica dispersion by biomimetic approach https://doi.org/10.1021/acsapm.2c01588	ACS Applied Polymer Materials	5	441--451	2022
167	Guchait, Aparna; Ganguly, Debabrata; Sengupta, Chandan; Chattopadhyay, Santanu; Mondal, Titash	Synthesis of Polyetheramine grafted Epoxidized Natural Rubber and its Role in Humidity Adhesive Sensor https://doi.org/10.1021/acssuschemeng.2c05167	ACS Sustainable Chemistry & Engineering	10	16780--16792	2022
166	Lakshmi M Mukundan, Remya Nirmal S, Nikhil Kumar, Santanu Dhara and Santanu Chattopadhyay	Engineered nanostructures with sol-gel bioactive glass for enhanced bioactivity and modulated drug delivery https://doi.org/10.1039/D2TB01692C	Journal of Materials Chemistry B	10	10112--10127	2022
165	M. Goswami, Nils Hendrik Kröger, Filippo Berto, S. Chattopadhyay	Finite element method based damage model to characterize effect of geometric configuration on fracture properties of elastomeric composites https://doi.org/10.1080/15376494.2022.2051102	Mechanics of Advanced Materials and Structures	30	2149--2163	2022
164	M. Goswami, G. Subbarayan, S.P.A. Bordas, S. Chattopadhyay	Historical purview and recent advances in fracture mechanics of elastomeric matrix composites https://doi.org/10.1016/bs.aams.2022.09.002	Advances in Applied Mechanics	56	139--187	2022
163	S. Sharma, D. Goswami, M. Goswami, A. Deb, B. Padh, and S. Chattopadhyay	Computational fluid dynamics modeling of multicomponent elastomeric complex profile while flowing through extrusion die https://doi.org/10.1016/j.cej.2022.138756	Chemical Engineering Journal	451	138756	2022

162	Das S, Pal K, Chattopadhyay S and Bhowmick A K	3-Octanoylthio-1 propyltriethoxysilane functionalized silica/rubber composites for application in tire: Structure, performance and synergism https://doi.org/10.1002/pc.26863	Polymer Composites	43	7575--7599	2022
161	Sahoo S, Basu D, Kumar A, Nawale M, Kadam S, Bhujbal A, Rajkumar K, Bhowmick A K and Chattopadhyay S	Bio-based oil derived from waste coconut shell: a potential additive for enhancing silanization in silica filled styrene butadiene copolymer https://doi.org/10.1007/s10965-022-03168-2	Journal of Polymer Research	29	311	2022
160	Khanra S, Sreenivasan P, Das S, Hore R, Ganguly D and Chattopadhyay S	Immobilization of a biobased process aid at the interface for binary silicone and fluoroelastomer based super specialty blends with silica for enhanced compatibility https://doi.org/10.1007/s10853-022-07504-1	Journal of Materials Science	57	13974--13990	2022
159	Ghorai S K, Dutta A, Roy T, Ray P G, Ganguly D, Ashokkumar M, Dhara S and Chattopadhyay S	Metal Ion Augmented Mussel Inspired Polydopamine Immobilized 3D Printed Osteoconductive Scaffolds for Accelerated Bone Tissue Regeneration https://doi.org/10.1021/acsami.2c01657	ACS Applied Materials	14	28455--28475	2022
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46	Mishra A.K., and Chattopadhyay S.	"Thermoplastic Polyurethane-Modified Laponite Clay Nanocomposites"	Indian Institute of Technology, Thesis,	--	--	2010
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29	Praveen S., Chakraborty B.C., Jayendran S., Raut R.D., and Chattopadhyay S.	"Effect of Filler Geometry on Viscoelastic Damping of Graphite/Aramid and Carbon Short Fiber-Filled SBR Composites: A New Insight" https://doi.org/10.1002/app.29064	Journal of Applied Polymer Science	111(1)	264-272	2009
28	Mitra S., Chattopadhyay S. and Bhowmick A. K.	"Influence of Nanogels on Mechanical, Dynamic Mechanical and Thermal Properties of Elastomers" https://doi.org/10.1007/s11671-009-9262-5	Nanoscale Research Letters	4(5)	420-430	2009
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16	Rincon C., Chattopadhyay S. and Meredith J. C.	"Development of Semi-conductor Bio-materials for Regulating Cell Growth"	The 2007 Annual Meeting	--	--	2007
15	Satapathy S., Chattopadhyay S., Chakrabarty K. K., Nag A., Tiwari K.N., Tikku V.K. and Nando G.B.	"Studies on the Effect of Electron Beam Irradiation on Waste Polyethylene and its Blends with Virgin Polyethylene" https://doi.org/10.1002/app.23970	Journal of Applied Polymer Science	101(1)	715-726	2006
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12	Sormana J. L., Chattopadhyay S. and Meredith J. C.	"High-Throughput Mechanical Characterization of Free-Standing Polymer Films"	Review of Scientific Instruments	76 (6)	062214	2005
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9	Chattopadhyay S. and Meredith J.C.	"Combinatorial Studies of Polymeric Conducting-Insulating thin Film Dewetting" DOI 10.1088/0957-0233/16/1/017	Abstract of Papers of the ACS	226	U367	2003
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5	Chattopadhyay S., Chaki T.K. and Bhowmick A. K.	"Structural Characterization of Electron-beam Cross-linked Thermoplastic Elastomeric Films from Polyethylene and Ethylene Vinyl-acetate Copolymers"	Journal of Applied Polymer Science	81	1936-1950	2001

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3	Chattopadhyay S., Chaki T.K. and Bhowmick A.K.	"Electron Beam Modification of Thermoplastic Elastomeric Blends Made from Polyolefins" https://doi.org/10.1023/A:1017989526538	Journal Material Science	36(18)	4323-4330	2001
2	Chattopadhyay S., Khastgir D., Chaki T.K. and Bhowmick A.K.	"Electrical Properties of Electron Beam Modified Films of Thermoplastic Elastomeric LDPE and EVA Blends" https://doi.org/10.1177/096739112000080534 5	Polymers and Polymer Composites	8 (5)	345-354	2000
1	Chattopadhyay S., Chaki T.K. and Bhowmick A.K.	"Heat Shrinakability of Electron Beam Modified Thermoplastic Elastomeric Films from Blend of Ethylene Vinyl Acetate Co-polymer and Polyethylene" https://doi.org/10.1016/S0969-806X(00)00304-2	Radiation Physics Chemistry	59(5)	501-510	2000

Sponsored Projects as PI:

Grant agency	Title of the project and reference number	From and to (date/month)	Duration	Amount in lakhRs.
1. ISIRD, SRIC, IIT Kharagpur	An approach for recycling of polymeric wastes	01-02-2006 to 31-01-2007	12 months (Completed)	1.0

2. DST, First Track Project	Nanotechnology and radiation processing of organic-inorganic hybrid materials based on thermoplastic elastomer	02-01-2006to 31-01-2009	37 months (Completed)	9.12
3. DMSRDE, DRDO, Kanpur	The Influence of magnetic Nanocomposite to Enhance Thermo-mechanical Properties of SMPs	09-10-2009 to 31-10-2011	24.6 months (Completed)	9.9
4. NPOL, DRDO, Kochin	Development of Rubber Nanocomposite based encapsulant	06-09-2011 to 05-03-2013	31 months (Completed)	9.0
5. Small Industry	Analysis of polymer/rubber block	01-11-2016 to 15-12-2020	49.5 months (Completed)	1.5
6. UshaMartin, Ranchi, JH	Analysis of polymer for composite wire rope	20-04-2016 to 05-06-2016	1.5 months (Completed)	4.5
7. IGCAR, Tamil Nadu	Visual, Dimensional and physico-mechanical evaluation of 2-meter diameter inflatable seals, green and slab specimens: module I	15-06-2017 to 31-10-2018	16.5 months (Completed)	18.15
8. CEATLTD, Mumbai	Understanding and characterization of rubber fatigue and viscoelastic behavior for dynamic applications	24-04-2017 to 28-02-2021	46 months (Completed)	17.65
9. DST	Multifunctional polymer/ mesoporousbioactive glass composite nanoparticles as a targeted drug delivery platform for bone	22-09-2017 to 21-03-2021	42 months (Completed)	21.50
10. Small Industries	Polymer Testing	25-09-2018 to 15-12-2020	26.5 months (completed)	2.95
11. Usha Martin, Ranchi, JH	Analysis of polymer for composite wire	Oct 2018 to March 2019	06 Months (Completed)	3.5
12. ICICI Lombard	Analysis of Special Type of SBR	01-08-2018 to 31-08-2018	01 months (Completed)	0.5
13. Apollo Tyres Ltd.	Development of green NR compounds for tire by replacing carbon black with silica filler restricting its flocculation without compromising wear and abrasion	01-04-2019 to 30-06-2022	39 months (Completed)	34.78

14. SERB – CRG (Core Research Grant)	Sustainable Exploitation of Industrial Wastes in Rubber Composites for Isolators and Battery Packing in Electrical Vehicles	14-01-2021 to 13-01-2024	Three Years (ongoing)	39.71
15. ARDB – DRDO	Development of Long-Lasting Polyurethane Nanocomposite Films and Life Time Estimation using Finite Element Analysis with respect to Aerostat Application	22-12-2021 to 21-12-2024	Three Years (ongoing)	46.03
16. SERB-OVDF	Characterizing and modelling the influence of silane/amine with varying silica content in rubber compound for tire application	01-01-2022 to 31-12-2022	12 months (ongoing)	22.21
17. Laminar Air Conditioning (UAE)	Gaskets for Smoke Dampers	01-04-2022 to 28-02-2023	12 months (ongoing)	16.06
18. GOI - Scheme for Promotion of Academic and Research Collaboration (SPARC)	Stretchable Piezoelectric Elastomer Composites	31.03.2022	ongoing	84.35
19. Science and Engineering Research Board (SERB)	A hybrid bi lineage system for efficient diabetic wound healing	01.04.2024	ongoing	26.736
20. PARKER HANNIFIN INDIA PRIVATE LIMITED, Hyderabad	Designing super abrasion resistant tough cover for hoses in order to eliminate the current usage of Ultra High Molecular Weight Polyethylene (UHMWPE) film on the hose cover	27.09.2024	ongoing	12.39

21. J.G. CHEMICALS LIMITED, Kolkata	Improving the particle size of the ZnO via precipitation, mechanical and modified French process	01.06.2025	ongoing	22.50

Sponsored Projects as Co-PI:

Grant agency	Title of the project andreference number	From and to (date/month)	Duration	Amount in lakhRs.
1. ISRO, Bangalore	Segmented polyurethane (SPU) based nanocomposites from functionalized nanoclays with special reference to fire and flammability	05-01-2006 to 31-01-2008	Two years (Completed)	**6.28**
2. DAE,BARC	Development of electron beam irradiated composites based on multiwalled carbon nanotubes in polymeric matrices	08-06-2007 to 07-06-2010	Three years (Completed)	**14.6**
3. CEAT MUMBAI	Application of nanotechnology for improving impermeability of gas and moisture of TBR/PCR inner liner materials	17-08-2011 to 31-07-2015	47.5 months (Completed)	**17.42**
4. RCMA Nashik	Ageing, failure analysis and life estimation of rubber seals of military aircraft.	13-07-2007 to 12-07-2008	One year (Completed)	**9.16**
5. IGCAR, Tamilnadu	Studies on the technical requirements of elastomeric inflatable seals	01-01-2006 to 30-06-2007	Six months (Completed)	**9.0**
6. Phoenix Yule Ltd., Kalyani, W.B	Elimination of pit mark on platen during vulcanization ofFR conveyor belt	02-07-2007 to 31-03-2008	Nine Months (Completed)	**2.0**
7. NAC group, Aurangabad	Development of Dough Molding Compound	01-06-2006 to 01-08-2007	Two Months (Completed)	**1.0**
8. IMPRINT 2, SERB	Invention of Smart Process Technology for Production of Valuable Products including Oil and Carbon Black from WasteTire	15-01-2019 to 14-07-2022	42 months Ongoing (Completed)	**88.0**

9. IRI	Training and skill development and its evaluation for IRI members	01-01-2021 to 31-12-2023	36 months (ongoing)	**7.52**
10. Indian Railways	Development of next generation elastomeric pad for heavy haul freight wagon	15-12-2021 to 14-12-2022	12 months (ongoing)	17.70

Reviewer of Journals:

- Reviewer: Rubber Chemistry and Technology
- Reviewer: Biomacromolecules
- Reviewer: Acta Biomaterialia
- Reviewer: Polymer
- Reviewer: Journal of Applied Polymer Science
- Reviewer: Polymer Composites
- Reviewer: J. Materials Science
- Reviewer: Polymer International
- Reviewer: Polymer Engineering & Science
- Reviewer: Polymers for Advanced Technologies
- Reviewer: Composites: Part A
- Reviewer: J. Polymer Research
- Reviewer: Composite Science and Technology
- Reviewer: e-Xpress Polymer Letters
- Reviewer: RSC Advance
- Reviewer: ACS Industrial and Engineering Chemical Research
- Reviewer: Macromolecules
- Reviewer: Materials Chemistry-B
- Reviewer: Journal of Industrial Textiles
- Reviewer: Scientific Reports
- Reviewer: Materials Today
- Reviewer: ACS Applied Materials
- Reviewer: Colloids and Surface B: Biointerface
- Reviewer: Colloids and Interfaces Science
- Reviewer: Materials Letters
- Reviewer: Carbon
- Reviewer: Journal of Materials Research
- Reviewer: International Journal of nanomedicine

International/National Conference/Symposium:

- A. Kumar, S. Chattopadhyay "Analyzing Geometrical Imperfections on Tire Tread Compound and Mechanical Validation Through Finite Element Analysis", APM 2022.
- A. Bera, S. Chattopadhyay "An early-stage modification of natural rubber by bio-based integrant: a green obtention to enhance the efficacy of silica dispersion of tyre tread compound", APM 2022.
- R. Hore, S. Chattopadhyay "Exploitation of Hybrid Composite System for the Vibration Isolator Application", APM 2022.
- A. Guchait, T. Mondal, S. Chattopadhyay "Impact of Nano-filler on the Adhesion Properties of Pressure -sensitive Adhesives", APM 2022.
- D. Ganguly, S. Chattopadhyay "In-situ modification of filler-filler network improvising the thermal conductivity and dispersion in hybrid elastomeric composite", APM 2022.
- S. Sharma, A. Deb, S. Chattopadhyay "Investigating the structural deformation of the extrudate during the processing and simulation of an extrusion die for polymeric products", APM 2022.
- M. Goswami, S. Chattopadhyay "Mixed-Mode and Mode-I fracture analysis of elastomeric composites using damage model assisted finite element analysis", APM 2022.
- N. Kumar, S. Chattopadhyay "Multi Stimuli Responsive Biphasic Dual Network Hydrogel for Drug Delivery", APM 2022.
- S. Das, A. K. Bhowmik, S. Chattopadhyay "Physico-mechanical properties of NXT silane grafted Styrene butadiene rubber/silica composites", APM 2022.
- L. M. Mukundan, S. Dhara, S. Chattopadhyay "Polycaprolactone encrusted bioactive glass antibiotic nanohybrid through drug mediated surface-initiated polymerization", APM 2022.
- S. Khanra, S. Chattopadhyay "Reactive Compatibilization of the Fluoroelastomer and Silicone Rubber Blend with Fluoroelastomer-g-Acrylamide", APM 2022.
- P. Sreenivasan, S. Chattopadhyay "Study of processing and sound attenuation characteristics of hollow glass balloon filled rubber composites", APM 2022.
- R. Koley, S. Chattopadhyay "Sustainability in Indian rubber industries framework: How to practice, implement and face the future challenges of business", National Rubber Conference (NRC 2022), Delhi-NCR.
- M. Goswami, S. Chattopadhyay "A Damage Model Based on Maximum Principal Strain Theory to Trace Fracture of Elastomeric Composites: Finite Element Analysis and Experimental Validation", International elastomer conference, 2021.
- S. Sharma, A. Deb, S. Chattopadhyay "An Approach to investigate the effect of rheology during polymer extrusion using computational method", Complex Fluid 2021.
- S. Sharma, A. Deb, S. Chattopadhyay "An investigation of polymeric extrudate rheological behaviour using a computational method", 7th Edition of International Conference on Polymer Science and Technology, 2021.
- S. Sharma, A. Deb, S. Chattopadhyay "An investigation of structural deformation on elastomeric profiles during extrusion process using finite element analysis", Global conference on advances in polymer science & nanotechnology, 2021.
- S. Sharma, A. Deb, S. Chattopadhyay "Design and development of polymeric extrusion die", 12th Asia Pacific Conference on Polymer Science and Engineering, 2021.
- S. Sharma, A. Deb, S. Chattopadhyay "An investigation of structural deformation on elastomeric profiles during extrusion process using finite element analysis", Global conference on advances in polymer science & nanotechnology, 2021.

- S. Sharma, A. Deb, S. Chattopadhyay "An investigation of structural deformation on elastomeric profiles during extrusion process using finite element analysis", Global conference on advances in polymer science & nanotechnology, 2021.
- R. Koley, R. Kasilingam, S. Sahoo, S. Chattopadhyay, A.K. Bhowmick, "Synthesis and characterization of bio-based tackifying resin and it's application in rubber", ACS, International Elastomer Conference, Knoxville, USA. 21st October, 2020. (Best presentation award)
- S Pradhan and S. Chattopadhyay "Graphene Nanoplatelet: Potential Nanofiller for Polychloroprene Elastomer" at e-Poster Conference on COMSE, May 15 – 20, 2020.
- M. Goswami, Sunil Goyal, G.A. Harmain and S. Chattopadhyay "Adapting Finite Element Method as a Propitious Structural Analysis Tool for Metals and Polymers" at e-Poster Conference on COMSE, May 15 – 20, 2020.
- S. Khanra and S. Chattopadhyay "Compatibilization of silicone rubber and advanced polymer architecture based fluoroelastomer for high performance blend using fluorosilicone and silica" at e-Poster Conference on COMSE, May 15 – 20, 2020.
- S.K.Ghorai, S. Maji, T.K.Maiti and S. Chattopadhyay "Accelerated bone regeneration of polyurethane-urea based 3D nanohybrid scaffolds through titanium phosphate decorated nanohydroxyapatite" at e-Poster Conference on COMSE, May 15 – 20, 2020.
- D. Ganguly and S. Chattopadhyay "Electrical, thermal and rheological properties of hybrid ceramic-carbon filled HNBR System" at e-Poster Conference on COMSE, May 15– 20, 2020.
- S. Sharma, Arghya Debb and S. Chattopadhyay "Predicting the Deformation Behaviour of the Extrudate during manufacturing of Complex Rubber Profiles using Finite Element Analysis" at e-poster conference on COMSE, May 15-20,2020
- D. Ganguly and S. Chattopadhyay "Rheological Studies on Mechno-Adaptive and Electrically Conductive Rubber Ceramic-Waste Composites with Reduced Carbon Footprint" at APM 20, CIPET Bangalore, February 13 - 15, 2020.
- M. Goswami and S. Chattopadhyay "Synergistic effect of silica in carbon black filled styrene butadiene rubber: Fracture analysis using finite element analysis." at APM 20, CIPET Bangalore, February 13 - 15, 2020.
- S. Sharma, Arghya Debb and S. Chattopadhyay "An Investigation of Overall Deformation due to Die-swell during Manufacturing of Extrudate Rubber Product Using Finite Element Analysis" at APM 20, CIPET Bangalore, February 13 - 15, 2020.
- L. Mukundan, S. Dhara and S. Chattopadhyay "Polymeric tempting approach for the infusion Apatite Nanocrystals in Mesostructured bioactive glass through sono-reacted sol- gel synthesis" at GSPFM 20, IIT KGP, February 7 - 8, 2020.
- D. Ganguly and S. Chattopadhyay "Smart Mechano-Adaptable Elastomeric Composites Having Superior Electrical Properties" at ICMAT 20, Mysore, January 16- 18, 2020.
- S. K. Ghorai and S. Chattopadhyay, "Polyurethane-urea Based Macro-porous Nanohybrid Scaffold for Bone Tissue Regeneration "at Jadavpur University, 10th January, 2020.
- S. Panja and S. Chattopadhyay, "Co-ordination assisted self-assembled nanostructures for biomedical applications" at Jadavpur University, 10th January, 2020.
- R. Koley, Rajkumar Kasilingam, Suchismita Sahoo, Anil K. Bhowmick and S. Chattopadhyay, "Synthesis of bio-based phenol furanic resin as a green additive for rubber application." at NRC Kolkata, December 4 -5, 2019. (2nd Position)
- S. Das, Sawar Dhanania, Anil K. Bhowmick and S. Chattopadhyay, "Reactive grafting of 3-Octanoylthio-1-propyltriethoxysilane in styrene butadiene rubber and its effect on green tire technology." at NRC Kolkata, December 4 -5, 2019.

- D. Ganguly and S. Chattopadhyay, "Effect of hybrid ceramic-carbon filler system on electrical, thermal and rheological properties of HNBR" at NRC Kolkata, December 4 -5, 2019. (3rd Position)
- S. Sharma, Arghya Debb and S. Chattopadhyay, "Predicting the Effect of Rheology in Rubber Extrusion using Finite Element Method" at NRC Kolkata, December 4 -5, 2019. (1st Position)
- M. Goswami and S. Chattopadhyay, "Fracture analysis of silica and carbon black filled SSBR using finite element method" at NRC Kolkata, December 4 -5, 2019.
- D. Ganguly, S. Khanra and S. Chattopadhyay "Mechano-Adaptive and Electro-Responsive Smart Elastomeric Composites" at APSRT 19, IIT KGP, September 24 - 27, 2019.
- S. Khanra, D. Ganguly and S. Chattopadhyay "Compatibilization of silicone rubber and advanced polymer architecture based fluoroelastomer for high performance blend using fluorosilicone and silica" at APSRT 19, IIT KGP, September 24 - 27, 2019.
- S.K.Ghorai, S. Maji, and S. Chattopadhyay " Metal co-ordinated polyurethane-urea based 3D nanohybrid scaffolds for bone tissue regeneration." at APSRT 19, IIT KGP, September 24 - 27, 2019.
- A. Kumar and S. Chattopadhyay "Significance of hyperelastic parameters for filled rubber: A validation through finite element simulation" at APSRT 19, IIT KGP, September 24 - 27, 2019.
- S. Das, S Dhanania, Anil K. Bhowmick and S. Chattopadhyay "Reactive grafting of 3-Octanoylthio-1-propyltriethoxysilane in styrene butadiene rubber and its effect on silica reinforced tire composites " at APSRT 19, IIT KGP, September 24 - 27, 2019.
- R. Koley, Rajkumar Kasilingam, Suchismita Sahoo, Anil K. Bhowmick and S. Chattopadhyay "Synthesis and characterization of phenol furfural resin from bioresources as a green compounding aid." at APSRT 19, IIT KGP, September 24 - 27, 2019.
- P. Mondal and S. Chattopadhyay at APSRT 19, IIT KGP, September 24 - 27, 2019. (Best Poster by ACS)
- D. Ganguly, S. Khanra and S. Chattopadhyay "Coining the Attributes of Cement like Ceramics in Hydrogenated NBR for Smart Applications" at IRC 2019, London, September 3 - 5, 2019.
- D. Goswami, Jayanta Das and S. Chattopadhyay "Enhancement of structural transition induced vibration-damping capacity in Ni-Mn-Ga-polysulfone composite" at ISMANAM 2019, Chennai, July 8 - 12, 2019.
- D. Ganguly and S. Chattopadhyay "Smart Cement Rubber Composites Having Cyclic Responsive Characteristics" at ICETSD 2019, Kolkata, March 5 - 6 2019.
- A. Kumar and S. Chattopadhyay "Validation of elastomer tensile properties with varying filler content using finite element analysis, proceedings of international conference on emerging technologies for sustainable development" at ICETSD 2019, Kolkata, March 5 - 6 2019.
- D. Ganguly and S. Chattopadhyay at IRC 2019, London, 3-5th September, 2019 on Coining the attributes of cement like ceramics in hydrogenated NBR for smart applications.
- D. Ganguly and S. Chattopadhyay at International Conference on Emerging Technologies for Sustainable Development 2019, Kolkata, March 19 on Smart Cement Rubber Composites Having Cyclic Responsive Characteristics.
- D. Goswami and S. Chattopadhyay at National Metallurgist's Day Annual Technological Meeting 2018, Kolkata, Nov 2018 on Effect of ball milling on the magnetocaloric performance of a NiMnGa alloy.
- S. Khanra and S. Chattopadhyay at NRC Kolkata, by AIRIA, Nov 2018 on Advanced Polymer Architecture (APA) Technology-based Fluoroelastomers
- A. Kumar and S. Chattopadhyay at NRC Kolkata, by AIRIA, Nov 2018 on An approach of predicting tensile response with varying filler loading in rubbers using Finite Element Analysis

- D. Ganguly and S. Chattopadhyay at NRC Kolkata, by AIRIA, Nov 2018 on Smart Stimuli Responsive Cement Rubber Composites (Best Poster)
- S. Sharma and S. Chattopadhyay at NRC Kolkata, by AIRIA, Nov 2018 on Design and Simulation of Extrusion Dies to Obtain Precise Rubber Profiles
- A. Kumar and S. Chattopadhyay at 23rd Rubber Conference by IRMRA, Mumbai, Dec 2018 on Prediction of tensile response with varying filler loading in rubbers – A validation using Finite Element Analysis
- S. Sharma and S. Chattopadhyay at 23rd Rubber Conference by IRMRA, Mumbai, Dec 2018 on Simulation of Extrusion Dies for Rubber Profiles (Best Paper)
- D. Goswami and S. Chattopadhyay at Innovation in Materials Science and Technology 18, Kolkata, Dec 18 on Enhanced vibration damping capabilities of a Ni-Mn-Ga alloy – Polysulfone composite material
- L. Mukundan and S. Chattopadhyay at Innovation in Materials Science and Technology 18, Kolkata, Dec 18 on Polymeric templating approach using amphiphilic block copolymers for ordering the mesopores of sol-gel derived bioactive glass
- S. Chattopadhyay, "Design and simulation of extrusion dies: an introduction to make perfect dies for rubber product", NRC, AIRIA, 23-24 Feb 2018, India.
- S. K. Ghorai and S. Chattopadhyay, at 5th TERMIS World Congress- 2018, Kyoto, Japan, Sept 18 on New Generation Spermine Based Polyurathane-Urea Derived High Strength Osteoconductive Scaffold
- T. Roy and S. Chattopadhyay at 5th TERMIS World Congress- 2018, Kyoto, Japan, Sept 18 on Biopolymer based electrospinning of synthetic polyester for tissue engineering applications.
- O. P Bajpai and S. Chattopadhyay, "Tuning Morphology and Functional Properties of Electrochemically Synthesized Polythiophene for Photovoltaic Applications: Effect of Solvent and Current Density", Advanced Energy Materials Congress – 25- 28 March 2018, Sweden, (Committed).
- K. Sarkar, D. Das, and S. Chattopadhyay, "Smart conductive cotton fabric by macro- structured carbon clusters for electromagnetic interference shielding", ICMAT-2017, Suntec City, Singapore, 18-23 June 2017.
- K. Sarkar, D. Das, and S. Chattopadhyay, "Smart and economic conductive textile for electromagnetic interference shielding", Suntec City, Singapore, 18-23 June 2017.
- K. Sarkar, D. Das, T. K. Chaki and S. Chattopadhyay, "Macro-structured carbon composites and their electrical properties for developing conductive textiles by coating process", TCPFT-2017, CRNN, University of Calcutta, Kolkata, 3-5 January 2017.
- K. Sarkar, D. Das, T. K. Chaki and S. Chattopadhyay, "Smart conductive cotton fabric by structurally modified carbon particles", 44th Textile Research Symposium, IIT Delhi, New Delhi, 14-16 December 2016.
- S. Panja and S. Chattopadhyay, "Synthesis and morphological study of branched PE-PCL immobilized superparamagnetic nanocomposite", Macro-2015, IACS, Kolkata, 23-26 January 2015.
- A. Dey, M. A. S. Khan, J. Athar, A. K. Sikder and S. Chattopadhyay, "Effect of microstructure on HTPB based polyurethane (HTPB-PU)", Macro-2015, IACS, Kolkata, 23-26 January 2015.
- S. Kumar, G.B. Nando, S. Nair, G. Unnikrishnan, A. Sreejesh and S. Chattopadhyay, "Application of nanotechnology for TBR/PCR tire inner liner materials", Tire Technology Expo 2015, Cologne, Germany, 10-12 February 2015.

- S. Kumar, G.B. Nando, S. Nair, G. Unnikrishnan, A. Sreejesh and S. Chattopadhyay, "Development, characterization and properties of novel quaternary rubber nanocomposites", 186th International elastomer conference, Rubber Division, ACS, Nashville, TN, USA, 14-16 October 2014.
- M. Selvakumar, S. K. Jaganathan, G. B. Nando and S. Chattopadhyay, "Structure property relationship of novel in-situ prepared thermoplastic polyurethane/hydroxylapatite nanocomposites with improved antithrombic property for biomedical applications", 186th International elastomer conference, Rubber Division, ACS, Nashville, TN, USA, 14-16 October 2014.
- S. Kumar, G.B. Nando, S. Nair, G. Unnikrishnan, A. Sreejesh and S. Chattopadhyay, "Development, characterization and properties of BIIR-CO rubber nanocomposites", Rubber Conference 2014, Beijing, China, 16-18 September 2014.
- Dey, J. Athar, A. K. Sikder, M. Ghosh, S. J. Pawar, A. Tripathi, H. Prasanth and S. Chattopadhyay, "Graphene-iron oxide nanocomposite: An efficient catalyst for ammonium perchlorate(AP) decomposition reaction", International Conference on Functional Materials (ICFM-2014), Materials Science Centre, IIT, Kharagpur, 5 -7 February 2014.
- S. Payyappilly, S. Dhara and S. Chattopadhyay, "Self assembled block copolymer nanoparticles for drug delivery", International Conference on rubber and rubber-like materials (ICRRM 2013), RTC, IIT Kharagpur, 6-9 March 2013.
- S. Panja and S. Chattopadhyay, "Synthesis and characterization of armed PE-PCL grafted superparamagnetic nanoparticles", International Conference on rubber and rubber-like materials (ICRRM 2013), RTC, IIT Kharagpur, 6-9 March 2013.
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- O. P. Bajpai, S. Panja, S. Chattopadhyay and D. K. Setua, "Nanocomposite based on piezoelectric polymer matrix and magnetic nanoparticles", ICRRM, IIT Kharagpur, 6-9 March 2013.
- S. Payyappilly, S. Dhara and S. Chattopadhyay, "Biodegradable injectable hydrogel for drug delivery", 7th International Conference on materials for advanced technologies (ICMAT-2013), Suntec, Singapore, 30th June-6th July 2013.
- S. Panja and S. Chattopadhyay, "Branched polymer-based pH responsive micelle for delivery of doxorubicin selectively on cancer cell: synthesis, characterization, cell uptake and release", (ICMAT 2013), Suntec, Singapore, 30th June-6th July 2013.
- A.K. Mishra, G.B. Nando and S. Chattopadhyay, "Novel morphology development of TPU-clay nanocomposites based on single & dual modified Laponite", Processing and Fabrication of Advanced Materials (PFAM-19), Auckland, New Zealand, 14-17 January 2011.
- U. Basuli, T.K. Chaki and S. Chattopadhyay "Studies on nanotube networks in polymer nanocomposites by dynamic and steady shear rheology", Processing and Fabrication of Advanced Materials (PFAM-19), Auckland, New Zealand, 14-17 January 2011.
- U. Basuli, T.K. Chaki and S. Chattopadhyay, "Polymer –nanosilica-carbon nanotube nanocomposites: unique nanofiller synergistic effect", Proceedings of Advances in Polymer Science and Rubber Technology (APSRT-2011) Challenges towards 2010 and beyond., IIT, Kharagpur, India, March 3-5, 2011.
- P.K. Chattopadhyay and S. Chattopadhyay, "Investigation of the hybrid filler microstructure in the performance property development within epoxidized natural rubber based ternary particulate nanocomposites", Oral presentation in International Rubber Conference and Exhibition-2010, Mumbai, 17-19 November 2010.

- S. Praveen, B.K. Chattopadhyay and S. Chattopadhyay, "Vibration damping and energy loss in bromobutyl rubber –Effect of filler size and shape", Oral presentation in International Rubber Conference and Exhibition-2010, Mumbai, 17-19 November 2010.
- U. Basuli, T.K. Chaki, and S. Chattopadhyay "Thermo-mechanical, electrical and morphological characteristics of ethylene methyl acrylate (EMA)/CNT nanocomposites", 2nd Indo Swiss Bonding International Symposium 2010, Sikkim Manipal University (SMU), 11-13 February 2010.
- S. Maji, P.K. Chattopadhyay, D. Khastgir and S. Chattopadhyay, "Oxidative degradation of polyolefin – a novel avenue plastics recycling", National Seminar on E-waste, NASEW- 10, NML, Jamshedpur, January 21-22, 2010.
- M. Mondal, P.K. Chattopadhyay, D.K. Setua, N. C. Das and S. Chattopadhyay "Self organization of macromolecules in novel TPU-clay Nanocomposites", Oral presentation in the 3rd International Conference on Multi-Functional Materials and Structures Jeonju, South Korea, September 14-18, 2010.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Electron beam modified LDPE/EVA based thermoplastic elastomeric nano-composites with improved properties", India Rubber Expo 2009, 5th International Exhibition, Conference and Reverse Buyer-Seller Meet, Hyatt Regency Kolkata, 2009.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Effect of silica nano-filler on the dynamic and capillary rheology of LDPE-EVA based thermoplastic elastomer", 25th Annual Meeting of The Polymer Processing Society (PPS 25), Goa, India, 2009.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Electrical properties and morphological study of LDPE/EVA based nanocomposites", International Conference on Hi-Tech Materials (ICHTM-09), Indian Institute of Technology, Kharagpur, India, 11-13 February 2009.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Electron beam modified thermoplastic elastomer nanocomposites based on inorganic nanofiller", International Conference on Electron Beam Irradiation: An Eco-Friendly Technology for Processing of Food and Industrial Products", The Maurya, New Delhi, India, 30-31 July 2009.
- K. Mishra, S. Chattopadhyay and G. B. Nando, "Polyurethane-laponite clay nanocomposites", IRE-09, Hyatt Regency, Kolkata, 2009.
- K. Mishra, S. Chattopadhyay and G. B. Nando, "Effect of aspect ratio and state of dispersion on the rheological behavior of TPU-clay nanocomposite", PPS-25, Goa, India, 2009.
- K. Mishra, S. Chattopadhyay and G. B. Nando, "Effect of modifiers on thermal properties of TPU- peptised laponite clay nanocomposite", MACRO-09, IIT, Madras, 2009.
- K. Mishra, S. Chattopadhyay and G. B. Nando, "Preparation and characterization of segmented polyurethane-laponite clay nanocomposites", ICHTM-09, IIT Kharagpur, 2009.
- U. Basuli, T.K. Chaki and. S Chattopadhyay, "Flexible composites based on EMA and modified conducting carbon black", IRE-09, Hyatt Regency, Kolkata, 2009.
- U. Basuli, T.K. Chaki, and S. Chattopadhyay, "Morphology and thermal properties of solution and melt-mixed multi-walled carbon nanotube/ EMA nanocomposites: a comparative study", PPS - 25, Goa, India, 2009.
- S. Praveen, P. K. Chattopadhyay, B. C. Chakraborty, and S. Chattopadhyay, "Indulgence of novel ternary structures comprising nanoclay-carbon black and elastomers: cooperative effect on property development", IRE-09, Hyatt Regency, Kolkata, 2009.
- S. Mitra, S. Chattopadhyay, Y. K. Bhardwaj, S. Sabharwal and A. K. Bhowmick, "Chemically crosslinked gels – new generation modifiers for elastomers", India Rubber Expo 2009, Hyatt Regency, Kolkata, 2009.
- S. Mitra, S. Chattopadhyay, and A. K. Bhowmick, "Improvement in processability of unfilled natural rubber by the addition of chemically crosslinked quasi-nano gels", PPS- 25, Goa, India, 2009.

- P. K. Chattopadhyay and S. Chattopadhyay, "Thermal and dynamic rheological studies on nanostructure development within novel ENR based ternary nano-composites", IRE- 09, Hyat Regency, Kolkata, 2009.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Dynamic and steady state rheology of radiation processed nano-silica filled model TPE blend systems", Second International Conference on Polymer Blends, Composites, IPNs, Membranes, Polyelectrolytes and Gels: Macro to Nano Scales (ICBC-2008), Kottayam, Kerala, 2008.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "A comprehensive study of degradation of nano-silica filled model TPE blend systems", International Conference on Advances in Polymer Technology, Kochi, Kerala, 2008.
- S. Hui, T. K. Chaki and S. Chattopadhyay, "Thermoplastic elastomer with nanofiller", International Conference on Rubber & Rubber-like materials (ICRRM-2008), Indian Institute of Technology, Kharagpur, India, 8-10 January 2008.
- A. K. Mishra, S. Chattopadhyay and G. B. Nando, "Synthesis and characterization of polyurethane laponite nanocomposite", Polychar-16, Lucknow, 2008.
- S. Praveen, A. Pradeesh, B.C. Chakraborty and S. Chattopadhyay, "Augmenting structural vibration damping: effect of filler geometry in SBR – a comparative study", IRMRA 20th Rubber conference, Ramada, Powai, Mumbai, 2008. (Awarded for best Student's paper).
- S. Mitra, S. Chattopadhyay, Y. K. Bharadwaj, S. Sabharwal and A. K. Bhowmick; "Effect of electron beam cross-linked gels on the rheological properties of raw natural rubber", ICRRM – 2008, IIT Kharagpur, India, 8-10 January 2008.
- S. Mitra, S. Chattopadhyay, S. Sabharwal and A. K. Bhowmick, "Electron beam crosslinked gels – preparation, characterization and their effect on the mechanical, dynamic mechanical and rheological properties of rubbers", IRaP – 2008, Rio de Janeiro, Brazil, 2008.
- G. B. Nando, A. K. Mishra, and S. Chattopadhyay, "Preparation and characterization of segmented polyurethane-laponite clay nanocomposites", Internationale Fachtagung Polymerwerkstoffe 2008, Halle/Saale Universitätsplatz, 2008.
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- S. Bhadra, N. K. Singha, S. Chattopadhyay and D. Khastgir, "Controlled conductive polyaniline by electropolymerization (Determination of structure-property relationship)", 12th International Conference on Polymers and Organic Chemistry (Under IUPAC auspices), Okazaki, Japan, 02-07 July 2006.
- S. Chattopadhyay, A. Ganguly, S. Saha and A.K. Bhowmick, "Modification of damping and frictional behaviour of ABS plastics with thermoplastic elastomer", India International Rubber Conf. & Expo 2007, 1-3 November 2007.
- G.K. Abraham, B. George, K.T. Thomas, S. Chattopadhyay and N.M. Mathew, "Effect of curing system and modification of EPDM on vulcanizate properties of ENR/EPDM blends", Asia Rubtech Expo '06, Kochi, Kerala, 23-25 November 2006.
- S. Maji, D. Khastgir and S. Chattopadhyay, "Oxidative degradation of polyolefins – a novel avenue of recycling", Asia Rubtech Expo, Kochi, Kerala, November 2006.
- T.K. Chaki, A.K. Bhowmick and S. Chattopadhyay, "Printability and peel adhesion studies of electron beam irradiated thermoplastic elastomeric film from LDPE and EVA", 19th Internationales symposium SWISSBONDING, Zurich, Switzerland 23-25 May 2005.

- P. Zapata, J. Su, S. Chattopadhyay, C. Rincón, A. García and J. C. Meredith, "Combinatorial biosurface chip to study polymer - cell interactions", BIO 2005 Annual International Convention, Philadelphia, PA, 22 June 2005.
- S. Chattopadhyay and J. C. Meredith, “High-throughput screening of semiconducting-insulating polymer interfacial stability”, Proceedings of the Annual Meeting of the Adhesion Society, 2004.
- J. C. Meredith and S. Chattopadhyay, “Controlling dewetting and instability in conducting polymers and conducting/insulating polymer interfaces”, Technical Presentation, AIChE Annual Meeting, San Francisco, CA, USA, 16-21 November 2003.
- S. Chattopadhyay and J. C. Meredith, “Combinatorial studies of polymeric conducting-insulating thin film bilayer dewetting”, Technical Paper, 226th ACS National Meeting, New York, NY, United States, 7-11 September 2003.
- S. Chattopadhyay, Y. Kwon, A.K. Naskar, A.K. Bhowmick, and J.E. Puskas, “Novel dendritic (arborescent) polyisobutylene-polystyrene thermoplastic elastomers”, Technical Papers - ACS, Rubber Division, 162nd, Pittsburgh, PA, United States, 8-11 October 2002.
- S. Chattopadhyay, T.K. Chaki and A.K. Bhowmick, “Thermoplastic elastomeric films from ethylene vinyl acetate and polyethylene blend and its heat shrinkability”, Rub. Tech. 2000, New Delhi, India, 21-23 February 2000.
- S. Shaikh, S. Chattopadhyay, J. E. Puskas, “A new approach to measure the copolymer reactivity ratios by real time FTIR spectroscopy”, Polymer Preprints (ACS, Division of Polymer Chemistry), 2002.

Session Chaired and Invited Talks:

- Invited Speaker at CUSAT, a Symposium on "Nanocomposites for sustainable future" delivered lecture on “CFD modeling for the prediction of structural deformation/ instability in the polymeric extrudate profile due to die swell using 3D models”, May 10-11, 2023.
- Invited Speaker at NRC Delhi 2023 on “Innovative routes to facilitate silica dispersion in natural rubber for green and sustainable rubber products”.
- Session Chair and delivered an Invited Keynote Lecture at APM 2023, Bengaluru, “on Engineered nano-particulates and hydrogel based biomaterials towards bone tissue regeneration”.
- 7th National Conference on Biopolymers & Green Composites (BPGC 2022) at CIPET- Kochi, delivered a lecture on “Nanodoped nanohydroxyapatite incorporated polyurethane-urea based porous scaffolds for accelerated bone regeneration: A judicious approach”, December, 2022.
- Session Chair and delivered an Invited Lecture at IRC 2022, Bengaluru on “CFD modeling for predicting the flow behavior of filled EPDM rubber compound during extrusion: An approach to optimize the die design for complex automotive profiles”.
- Invited Speaker at NRC Kolkata 2022 on “Featuring Silicone Rubber and its Application Towards Footwear Industry”.
- Session Chair and delivered an Invited Keynote Lecture at APM 2022, CIPET: SARP-ARSTPS, Chennai, on “CFD modeling for the prediction of structural deformation/ instability in the polymeric extrudate profile due to die swell using 3D models”.

- Session Chair and Speaker at an international symposium, 'Exploring Molecules, Materials and Biomaterials for Sustainable Society', at Midnapore college on "Sustainability in Indian rubber industries framework: How to practice, implement and face the future challenges of business", 8-10 September 2022.
- Invited Speaker at NRC Delhi 2022 on "Sustainability in Indian Rubber Industries Framework: How to Practice, Implement and Face the Future Challenges of Business".
- Invited Speaker at NRC Mumbai 2022 on "Silicone and fluoroelastomer based high performance blend by strategic
- compatibilization replacing fluorosilicones unveiling Industrial prospects".
- Invited Speaker at NRC Delhi, 2019 on "Devulcanize waste rubber and alternative natural source of rubber: An approach for sustainable development".
- Invited Speaker at NRC Mumbai 2019 on "Finite element analysis as a sustainable tool toward global rubber business challenges".
- Session Chair and Speaker at NRC Kolkata and International Conference and Exhibition on Polymers, Mani Ram Dewan Trade Centre, Guwahati on 24th Feb 2018 "Design and Simulation of Extrusion dies, An introduction to make perfect dies for rubber products."
- Invited Talk at National Rubber Conference, Mumbai, 1st - 2nd Oct 18 on "Stimuli Responsive Smart Rubber-Cement and Cement-like Composites"
- Plenary Speaker at National Rubber Conference, Kolkata, 26th -27th Nov 18 on Futuristic Design for Rubber Products with Special Reference to Applications in E-Automotive, High-Speed Railways & Strategic Defense
- Invited speaker at Innovation in Materials Science and Technology 18, Kolkata 14-16 Dec 18 on Pentaerythritol Poly(caprolactone)-b-poly(acrylic acid) Based Light-responsive Nanogel for on Demand and Targeted Cancer therapy
- Invited speaker at 23rd National Rubber Conference by IRMRA, Mumbai, 14-15 Dec 18 on Augmenting Feathers of Macro-Structured Carbon Black to Textiles: Development of Smart Conductive Fabric
- Invited Speaker at J.K. Tyre, Hasetry, Mysore on "Microscopy of Rubbers for Tyre industries" 16th July 2018
- Guest Speaker at Cochin University of Science and Technology (CUSAT), 12th – 14th August 18 on "Extrusion Die Design – Way to Obtain Precise Shapes for Rubber Profiles."
- Invited speaker at Saint Gobain, Mori 1-2nd Oct 18, on Science and Technology of rubber mixing
- Invited speaker at IIT Guwahati 24-25 DEC,18 Co-ordination assisted self-assembled nanostructure: a futuristic engineered Nano-formulation for advanced therapeutic application
- Invited lecturer at International Rubber Expo (IRE) Mumbai 17-19 Jan 19, 4hours Lecture in workshop on Rubbers.

Short Term Course:

- Delivered lectures in Short Term Course On "Rubber Technology" at Rubber Technology Centre, IIT Kharagpur, 12-15 Nov 18 coordinated by Prof. A.K. Bhowmick and Prof. Santanu Chattopadhyay.
- Delivered lectures in Short Term Course On "Recent Advancement in Rubber Technology" at Rubber Technology Centre, IIT Kharagpur, 12-15 Feb 19, coordinated by prof. K Naskar and Dr. N. C. Das.

- Delivered lectures in off-campus Short Term Course On “Adhesion & Polymer basics at Asian Paints” at Asian Paints Limited, Mumbai, Feb 28 - March 2 2019, coordinated by Prof. A.K. Bhowmick and Prof. N. K. Singha.
- Delivered lectures in Short Term Course On “Recent Advancement in Rubber Technology” at Rubber Technology Centre, IIT Kharagpur, Feb 27 – March 2 2023, coordinated by Prof. K Naskar and Dr. T. Mondal.

Extracurricular Activities:

- Serving as Associate Dean (SA) of the Institute since January 2023.
- Served as Head of the Centre since October 2019 to September 2022.
- Chairperson in workshops: GSPFM 2020, RPGF 2021, FPMGS 2021, RAEC 2021.
- Appointed as the Gymkhana Election Officer for the year 2019-2020.
- Involved with the departmental administrative works (Prof-in-charge examination, training, purchase currently), Up to 2017 Spring for seven years acted as Seminar-in- charge). Accompanying students for Industrial visits every year.
- Associated Faculty, School of nanoscience and technology, IIT Kgp, since inception.
- Acted as the Warden, Patel Hall, IIT Kharagpur, October 2015 to October 2017.
- Acted as the Vice Chairman, Technology Aquatic Society, October 2014 to October 2017.
- Volunteered in the four convocations (2012, 2013, 2015 and 2016).
- Acted as the Warden, Patel Hall of Residence, July 2013 to December 2013.
- Acted as an Assistant Warden, MMM Hall from November 2010 to July 2013.
- Actively involved with Gymkhana activities with the students, worked as a sports advisor and Gymkhana student’s election since joining.
- Actively involved with the GATE and JEE activities and confidential operations.
- Participated in every year for night vigilance in student hostels. In 2010, given night vigilance for one month along with four other team members in RP and RK halls.
- Actively taking part in inter IIT staff sports meets and accompanying students.
- Involved with M. Tech. counseling, PhD interviews (every summer vacations since joined as a faculty).
- Development of laboratory facility, maintaining several sophisticated Instruments, Lab- in- charge.
- Organized short-term course as a coordinator and organized two international conferences in the capacity of Treasurer.
- Organizing members of IRI entrance examination since 2006.
- Delivered lectures for manpower training for several CEP sponsored short-term courses.

Software Proficiency:

C- Programming, Origin, MATLAB, AutoCAD, ABAQUS, ANSYS, Material Studio (BIOVIA).

Languages:

English (Professional proficiency), Bengali (Native), Hindi (Intermediate proficiency)

Declaration:

I hereby solemnly declare that all the statements given above are true and genuine to the best of my knowledge and belief.

Kharagpur, WB, India

December 2025

Prof. Santanu Chattopadhyay