Statement of Purpose

I am Akash Ghosh, a final year masters' student of Rubber technology Centre at Indian Institute of Technology (IIT) Kharagpur. I wish to pursue my Ph.D. studies at the Joint Doctoral Program at IIT Kharagpur and University of Manchester for "**Developing Electromagnetic Interference (EMI) Shielding Polymer Nanocomposite foams for next generation electronics**". I have received my Bachelors' degree in Industrial Chemistry from the esteemed, Ramakrishna Mission Vidyamandira, West Bengal. My first exposure to concentrated research was in the final year of my bachelor's, under Dr. Uttam kumar Ghorai (Head of Department). Throughout the timeframe, I worked on *"Synthesis and Characterization rare-earth doped oxide-based nanophosphor materials for LED applications"*. The aim was to synthesize nanomaterials with different dopant concentrations using Sol-gel and hydrothermal methods. During the project, I took the initiative to learn & operate **Powder XRD** and **UV-Vis Spectrophotometer** to analyse the valuable information like crystallite size, phase, and bandgap. I have explored the mechanism and the effect of the dopant in enhancing the different photoluminescence properties. Through the process and roadblocks, I understood the fundamentals of material science, synthesis, and research. I can confidently state that it laid the foundation stone for my passion towards research.

To further feed this I pursued Master of Science (M.Sc.) in Applied Chemistry from the same institution. My course work emphasized on Materials and Polymer Science. Meanwhile, being an organic chemist by essence, the field of polymers intrigued me the most. I got an opportunity to pursue my master's dissertation in collaboration with one of the top polymer research organizations in India, CSIR-National Chemical Laboratory, Pune on *"Biodegradable and durable cellulose-based coating materials"* under the supervision of Dr. Kadhiravan Shangmuthanan. I learned the nitty-gritty of the biopolymers and the extraction of cellulose from natural sources. I developed a sucrose-based crosslinker to enhance the durability of the coating. Simultaneously, I acquired knowledge of **FTIR & TEM** and different film preparation techniques like solvent casting and vacuum filtration. The experience enlightened me about the versatility of polymers and their vast application area. This fuelled my motivation to undertake further higher studies in an engineering course to understand the application of polymers from a grass root level & their industrial importance.

In 2020, I joined prestigious IIT Kharagpur to pursue my Master of Technology (M.Tech.) degree in Rubber Technology. During the course work, I came across, inspiring professor Dr. Titash Mondal, and was selected for carrying out my M. Tech thesis under his guidance. My thesis was industry-funded by one of the largest manufacturers of adhesive i.e., Pidilite Industries Limited, India. Presently, I am working on the "*Effect of different filler on Silicone-based Thermal Interface Material for electronics and automotive application*". I have explored the structure-property relationship of silicone-based products with different curing chemistry. My work involved the selection of different fillers, resins, further studies of their characteristics and therefore formulating a product through oriented designing of experiments. I utilized various equipment like **Dynamic Light Scattering (DLS)**, **Powder XRD** to characterize particle size, aspect ratio & crystallite size of fillers. I also investigated the rheological properties of polymer composites. Through this exposure, I have learned to drive target-orientated commercial research with a given set of constraints. The outcome of the study will aid in providing a thermal management solution to modern electronics and developing products from the scratch. This experience has exposed me to the challenges and opportunities present in the electronic application of polymers. It motivates me to go further on futuristic electronic application challenges like flexible electronics and electromagnetic interference. I would like to take this acquired knowledge and enhance it further in the field of higher research.

My research experiences during the past few years have steered my motivation in the field of functional polymers and nanocomposite. As the interdisciplinary nature of the study, it holds the potential to make a revolution in technology. In the long run, I see myself being active in the Material and Polymer Sciences community, using the power of scientific knowledge to address problems of practical importance. A Ph.D. degree would be the first step towards such a successful career. I am aware of the high standards set by both the primer institute IIT Kharagpur and University of Manchester, & I am confident of living up to it and contributing substantially to the research program. I submit my candidature for admission to the Joint Doctoral program and look forward to a fruitful relationship with you soon.