Sample Statement of Purpose - Materials Science

Whatever made you successful in the past won’t in the future.”- Lew Platt, CEO Hewlett Packard.

And I strongly believe that the future is in “Material Science and Engineering”. The electronic world is teeming with thousands of new devices coupled with an ever-increasing challenge of making these as small and compact as possible. Miniaturization is the call of the day. Materials Science and Engineering plays a key role in this revolution. The challenges of developing new and better materials in conjunction with devising novel applications to meet demanding needs, keeps a material science engineer at the cutting edge of technology. As quoted, the need to be creative and to think beyond the existing boundaries, will determine the technologies of future and I want to be a part of such exciting endeavors. To achieve this I would like to pursue my Graduate Studies in Material Science and Engineering and be a part of research which would be at the forefront of such changes.

I have always had a leaning towards the analytical and logical. During my schooling, I excelled at math and physics, culminating in my achieving the highest marks in my high school board exams in mathematics. Driven by my passion to learn I secured a place for myself in one of the premier institutes in Asia, the Indian Institute of Technology, Madras (IIT Madras) And here, I obviously opted to further pursue my dreams into the field I know is most exciting.

In my undergraduate years I have been given comprehensive training in basic sciences and engineering, with emphasis on my professional major beginning from the second year. While doing my courses under Basic Sciences in the Mathematics, Physics and Chemistry department I developed strong analytical skills and was able to increase my fundamental knowledge base. At the same time the courses under Basic Engineering gave me a chance to appreciate the practical aspects of science and technology. Courses like Physics-II taught me electrostatics, dielectrics and polarization while Chemistry-II introduced me to atomic and subatomic characteristics of materials. Equipped with these sound fundamentals I entered the fascinating world of “Materials”.

The courses in my professional major encompassed not only the conventional metallurgy of metals, but also gave me insight into Ceramics, Powder Metallurgy, Physical and Mechanical Metallurgy, Corrosion etc. The courses in Thermodynamics, Material Characterization and Phase Transformation provided the
necessary insights for better understanding of the subject. The flexibility offered by my department, in form of electives, gave me an opportunity to pursue courses of my choice. I tailored my course schedule so as to include courses namely, Modern Experimental Techniques, Composite Materials, Advanced Materials and Processing Techniques, but the ones which captivated me most were Physics of Materials, Electronic Materials and Modern Materials.

Physics of Materials launched me into the underlying principles, properties and application of semiconductors, superconductors and magnetic materials. I also learnt very interesting concepts like energy band gap, free electron theory, Bose-Fermi statistics, Maxwell-Boltzmann distribution, Brillouin Zones, quantum wells and tunneling. These new concepts inspired me and hence I took up “Electronic Materials” to delve deeper into the subject. This course helped me understand the various crystal growth techniques and the eventual fabrication of an I.C. chip. It also introduced piezoelectric and pyroelectric materials and their application in microphones, buzzers and energy sensors respectively. As a part of the syllabus, we had paper presentations on III-V Semiconductors, Solar Cells, Magnetic Storage, Night Vision Sensors, SQUID, Band gap engineering etc. This required extensive reading and my interest kept growing with the expanding horizons of my knowledge. This also helped me inculcate the habit of reading journals and keeping abreast of latest developments in the field.

The recent developments and the challenges lying ahead made me realize that electronic materials are a dominating factor in the many areas of modern technology and the need to understand them is paramount for a materials engineer. It combines elements of Physics, Electrical Engineering and Material Science, all of which inspire me. It was thus that I decided to pursue my Graduate Studies in the realm of “Electronic Materials”.

To familiarize myself with research, I undertook three projects, of which one was done during my summer internship at NMDC ltd. In this project I had to improve the carburization of shifter sleeves using six-sigma tools. Working with a dedicated team, we followed sponge iron. The other two projects were done in my institute under my department. One was Boronizing of Austenitic Stainless Steel to study its physical properties and the other, a part of my major thesis, called Study and Modeling of Creep Curves. These gave me an opportunity to work in a team, with a sense of focus and responsibility always keeping in mind the eventual goal to be achieved. It was a rich experience as I learnt the intricacies involved in research and the kinds of demands that it makes. All of this coupled with the
sense of achievement which comes at the end, encouraged me to be a part of research which would help me explore the areas of my interest, namely Electronic Materials.

The research being carried out at Ohio State University, in Electronic Materials is both diverse and exhaustive. The University is among the best graduate schools in the world and offer excellent opportunities for research Materials Science and Engineering. I find research in Electronic Materials, in the department to be eminently compatible with my interest. I observe that many projects being undertaken, study Electronic materials in device engineering, a perfect confluence of my areas of interest. The excellent research facilities in Electronic Materials at Ohio State University combined with the able faculty guidance, offer me an invaluable opportunity to complete my graduate studies. I am confident that I have the necessary drive, intellectual competence and requisite skills to succeed in your Graduate Program, and I look forward to joining your esteemed university.