Student's Name

Professor's Name

Course Name/Code

Date

Graduate School Essay for MIT: Materials Science

The failure I remember most clearly from my undergraduate research was a membrane that dissolved too quickly. It was supposed to function as a drug delivery scaffold, a polymer matrix that would release a therapeutic agent at a controlled rate inside the body. I had spent six weeks synthesizing it. It lasted eleven seconds in the test solution.

I spent the next three weeks understanding why. That process, working backward from failure to mechanism, is what drew me to materials science as a discipline. The failure was not a setback. It was a dataset.

I worked in Professor Yuki Tanaka's lab at UC San Diego for two and a half years, focusing on the synthesis of biodegradable polymers for biomedical applications. In that time I contributed to a paper on the degradation kinetics of PLGA-based scaffolds under simulated physiological conditions, currently under review. The work gave me a strong foundation in characterization methods, including NMR, GPC, and DSC, and exposed me to the challenge I want to spend my graduate career addressing: the gap between a material's behavior in a bench-top test and its behavior in a biological environment.

MIT's materials science program offers what I need to close that gap. Professor Chen Wei's research on the in vivo performance of biodegradable implant materials connects directly to this problem, and the program's integration of synthesis and biological testing infrastructure within a single research environment is not something I can replicate elsewhere. I want to develop materials that behave predictably not just in a flask but in a body, and to build the analytical methods to measure that difference.