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Research is the satiation of one's natural curiosity. At the cusp of technological breakthroughs, working in a laboratory has provided me with a once-in-a-lifetime experience. Last summer, I was given the opportunity to take part in the true research experience, working to apply new chemicals to create safer products.

At Rensselaer Polytechnic Institute, I experienced what it was like to work on a research team conducting studies with genuine impact. Through the guidance of Dr. Richard Gross and Xue Wang, I was able to take part in hands-on research and learn more than I ever could in a classroom environment. Through the support of the Laura Weinberg and Lisa Levine of the Great Neck Breast Cancer Coalition, I was able to go beyond basic research, entering a world of science in which I hope to continue to make strides in my future.

Food packaging plastics have long been a point of interest for materials chemistry due to several links to breast cancer. Bisphenol A (BPA) and perfluorooctanoic acid (PFOA) are plasticizers linked to breast cancer used in the creation of these plastics, making their replacement a serious concern for the research community. Beyond these health concerns, the prevention of excessive food waste and plastic usage also necessitate the creation of a safer, biodegradable, sustainable food packaging film.

The research I conducted at RPI focused on the development of a novel food packaging material through the use of emulsion systems. When dried with physical crosslinking between

component molecules, these systems can form films that exhibit antimicrobial and antioxidative properties: the essential components of food preservation. Emulsions are mixtures of normally immiscible liquids, such as oil and water. Applied in various products including food packaging, cosmetics, and drug delivery, these systems utilize molecules called emulsifiers to maintain stability. To create the food packaging films, I tested various composition and formulation procedures of emulsions containing water, essential oils, sophorolipid butyl ester (SL-BE), and poly-γ-glutamic acid (γPGA).

SL-BE, which served as the primary emulsifier of the emulsion systems, was synthesized through the modification of sophorolipids produced by the fermentation of the yeast *Candida bombicola*. Previous research in Dr. Gross' lab tested sophorolipid esters similar to SL-BE for their efficacy as emulsifiers, concluding that these molecules could provide a safer alternative biosurfactant to existing emulsifiers. All the components were selected for their antimicrobial and antioxidative properties, as well as their biocompatibility. The component concentrations and formulation procedures were varied to test the optimal conditions for the food packaging film. Samples were analyzed for stability using vial imaging, microscopy, and dynamic light scattering (DLS) analyses. As a result of testing hundreds of distinct systems and triplicating all the data, my research found optimal compositions and procedures for the creation of a stabilized, safer food packaging film.

During my six-week internship at RPI, I worked with Dr. Gross and Xue on this green chemistry research. I also attended weekly meetings with the rest of the research team and gave several presentations regarding my progress. I was also supplied with journal articles to learn the background studies for my project. Dr. Gross and Xue instructed me on laboratory safety

procedures and guided my work, offering new routes for research. Outside of the lab, I read through research papers in the dorms of Russell Sage College and explored the city of Troy, NY.

None of these unforgettable experiences would have been possible without the support of the Great Neck Breast Cancer Coalition, and I hope to aid in the coalition's continued success in the future.