

When you are 17 year old high school student, it is hard to say that you have the luxury of being independent. Wars are fought for independence; we analyze independence in historical contexts; yet, us teenagers don't really know what independence is. We eat, sleep, and work on under our parents rules and our school's bells system. However, this summer my partner, Sidney, and I learned what it means to be independent and also about the responsibility that is coupled with it.

Sidney and I were given the opportunity to dedicate our summer to work at Dr. Richard Gross's Green Chemistry Lab at Rensselaer Polytechnic Institute this summer. When getting the acceptance email from the Great Neck Breast Cancer Coalition, I was received with a mix of emotions; a sense of pride that I was one of the nine candidates selected to be part of the GNBCC, a noble organization that take strides to increase breast cancer awareness; also excitement, for I was going to spend the next 6 weeks with my best friend Sidney working on a Breast Cancer related science project. Yet, part of me was also nervous. Being a biology centered student, the thought of chemistry—and moreover "Green Chemistry"—was unsettling. In high school, chemistry invokes dread—just as many student feel; the class is filled with memorizing formulas, concentrations, and the periodic table of elements. However, after completing my summer internship in Gross's lab, I can say with full confidence that my fear and reluctance of pursuing chemistry has now been replaced with admiration and respect.

Before I talk about the program itself, let me talk about Rensselaer; it literally is a university situated on top of a green and fertile hill. The campus is filled with shrubbery, pine trees, and rose bushes. The scenery is green and very natural; however, you can not describe

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Internship Attended: Rensselaer Polytechnic Institute, Dr. Richard Gross

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the buildings as just "natural." The building where Sidney and I worked in, Bio-Tech, makes you

forget that you are in the year 2015; it is a building that is ahead a few decades. The all glass

exterior combined with the state of the art science equipment inside really made working a pleasure.

The admiration and respect for chemistry was brought on by my mentor, Amanda, who we met on our first day at RPI. With her, Sunny, Michael, Jasmine, Sidney, and I were given a tour of both Bio-Tech and the Center of Polymers, the two labs that we would be working in. After, we were given a lab safety test, a series of videos and questions that lasted a little over 2 hour. Without the safety test we would not be allowed to work in the lab. Once we passed the test—which required mostly common sense—we had a meeting with Dr. Gross. You would expect that, being a man with so many accomplishments under his belt, Dr. Gross would be an overwhelming person to have a conversation with; that is far from the case. Dr. Gross is one of the easiest person to talk to. He took the time to learn which school we came from, our goal sand our passions which really made us feel welcomed. From this meeting, we picked a topic of interest and thus began our research.

The first few days of our research consisted of Sidney and I reading up on science literature. We had decided to work on finding a method to remediate soil contaminated by crude oil without using toxic surfactants and harmful chemical emulsifiers. The reason why we chose to research how to remediate crude oil was because of the increased use of land based travel as a medium to transport crude oil; and, with this increased use of land based travel comes oil spills and other accidents which exposes our environment to toxic crude oil. Crude oil itself has many volatile and carcinogenic compounds , such as benzene and butane, that poses an immediate threat to both the environment and the people living in it. Moreover, the companies that experience oil spills on land try to clean the environment by using chemical surfactants such as Polysorbate 80, which in its industrial grade produces 1,4-Dioxane as a byproduct, a known carcinogen. This fact about synthetic emulsifiers caught our attention; according to the Breast Cancer Fund, “benzene exposure is associated with an elevated risk of breast cancer”

as well as 1,4-Dioxane. These toxic chemicals may seep into ground water and lead to human exposure to carcinogens.

In order to replace volatile chemical emulsifiers, Sidney and I focused on using bio-based emulsifiers, a surface active agent, to remediate contaminated soil. Bio-based emulsifiers are biodegradable and are more sustainable than petroleum based commercial surfactants. We not only created bio-based emulsifiers, but also modified them using a process called Base Catalyzed Transesterification. We wanted to compare the effects of Natural and Modified emulsifiers to commercial surfactants. Based on our data recorded, the emulsifiers that we produced outperformed commercial surfactants, thus proving a viable substitute for the commercial surfactant.

Though the hours were long and there were many times where we had to skip lunch; it would be unfair to say that the program was all work and no play. From time to time the GNBCC group at RPI would head over to the Student Union and play a few games of pool or watch a movie in the common room. The days we skipped lunch, we'd usually order take out and eat on the side of a hill overlooking the sunset.

Our experience at Rensselaer was overall wonderful; yet, it is not over. Hopefully Sidney and I can continue presenting our work and remain involved with the activities sponsored by GNBCC. Our experience at RPI would not have happened had it not been for Laura Weinberg, Lisa Levine, and the rest of the GNBCC. Also, without the support of Dr. Richard Gross or Amanda at RPI we wouldn't have had half the results or knowledge that we received this summer. For the future Students & Scientist Breast Cancer/ Environment Research Interns, you have a lot to look forward to the summer that you are interning. Be prepared to make a difference and live up to the Great Neck Breast Cancer Coalition Standard; you are in for a great summer.