

Sunny Shi

Rensselaer Polytechnic Institute

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“Do you think the silver nanoparticle solution would work better as an antimicrobial agent than the low molecular weight chitosan?” “Should we get pizza or order Chinese?” Both questions take teamwork, patience, and hours of planning and coordinating in order to answer, and both questions can accurately describe my amazing summer experience at R.P.I. Not only was my summer a thought-stimulating, scientific thrill ride but also a thoroughly enjoyable 6 weeks with incredible new friends and memories that sprung from being together in an empty summer college campus in an isolated part of Troy.

This was my second summer working in Dr. Richard Gross’s phenomenal green chemistry lab in the Rensselaer Polytechnic Institute of Troy. The machinery and layout of the lab, the feel of the location, and the quietness of the empty college campus during the summer all felt familiar. Instead this time, my partner Michael and I were joined by new faces and companions in the GNBCC program: Jasmine Wong, an intelligent girl who was a rising senior at Great Neck North High School, and the dynamic knucklehead duo from Sewanhaka high school consisting of Sidney and Shaheer. All 5 of us worked on 3 separate projects, all under the mentorship of members of the Gross lab. With the guidance of Tony Maiorana, a graduate student at R.P.I, my partner Michael and I worked on developing a hydrogel that could be applied as a wound and burn healing device, as well as materials that could be used

in HVAC system engineering, and other material construction applications. Our hydrogel was designed to replace triclosan, an incredibly harmful substance that is used as an antimicrobial agent in a large amount of consumer goods. Triclosan is very damaging to the environment and our human bodies, being very closely tied to Breast Cancer. The substance is currently under fire and has been banned in several countries and one state in the United States. In order to outperform triclosan, our hydrogel would need to be effectively antimicrobial (bacteria killing), and thus, Michael and I got to work. After two ideas and experiments collapsing, Michael and I found an alternative. Hydrogels are crosslinked polymeric networks that are highly hydrophilic. If we used a silver nanoparticle solution, which has been known to kill bacteria, and soak the hydrogel in the silver nanoparticle solution, then the antimicrobial nanoparticles can be taken in to the hydrogel system thus rendering the gel antimicrobial. After generating the hydrogel itself, and the silver nanoparticle solution, we ran a killing test on the hydrogel and voila! Our new antimicrobial hydrogel could kill up to 99.999% of bacteria on the agar plate we tested with. The gel was cheap and easy to produce being made of pullulan, and also highly antimicrobial while being non-toxic to humans. Michael and I hope that with this new product, usages of triclosan can be cut down as much as possible.

Through all our trials and errors we really understood what it was like to be a professional researcher in the green chemistry field. While our project was mentored, its plan and idea was driven independently by us, and although it got rough at times, we can gladly say that not only did we get our desired result, but we did it ourselves. And while the science part of it all was fantastic, the people I met

and the great times we had over those six long weeks, completed an already fulfilling summer. The things we had to come up with to erase boredom in our dull college freshman dorms, were about as impressive as the ideas we had to come up in the laboratory. Microwavable food became my best friend, and my electric fan became my wife, in a now seemingly hilariously entertaining summer I'm sure I will be able to draw from soon when I will have to leave the comfort of home again next year.

One of the key things Michael and I learned this year through our scientific journeys was not only how to problem solve, but that not everything will work on the first try. We had to fail two times to succeed, and past experiences turn into valuable lessons that will generate success in the future. This entire summer was an experience, an experience that already has affected my life and an experience I know I can definitely have the comfort of remembering and learning from in the future. And this entire experience would not have been possible, if not for the tireless work of the GNBCC and its far-reaching visions. I want to thank all members of the organization, as well as all members of the Gross Lab for the most stimulating 6 weeks of my life so far.