2013 Great Neck Breast Cancer Coalition
Students & Scientists Breast Cancer/Environment Research Program
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For as long as I can remember, I have had a desire to create a safer chemical environment for future generations. The Great Neck Breast Cancer Coalition has allowed me to expand my experience by working in an extremely advanced laboratory and by participating in a truly innovative program. My inspiration, however, came from the researchers at the Warner Babcock Institute for Green Chemistry (WBIGC). Their goal is to create alternatives for carcinogenic chemicals that are present in everyday materials. Being part of the WBIGC has motivated me to want to be a part of the movement that will save lives and eliminate cancer risks from common chemicals.

At the WBIGC facility, I had the chance to work in a green chemistry lab and to collaborate with many of the scientists. Additionally, I was given the opportunity to share ideas with the founder of WBIGC, Dr. John Warner. Dr. Warner is a brilliant man who has groundbreaking ideas and a passion for the fight against using harmful chemicals in the production of consumer goods. Working with a fellow student researcher, my goal at the WBIGC facility was to find an alternative dye for khakis that does not contain harmful PCBs. To begin the experiment, we were given an abundance of untreated khakis. We cut the fabric into 1x1 inch squares. After cutting one hundred squares, we prepared a pre-wash bath containing soap and water and washed each square of khaki material. Once the pre-wash was complete the khakis were put in a drying oven at 100˚C.

We worked with two different polymers, both of which were synthesized at the Warner Babcock facility. 1:4 VBT:TMQ contains one vinyl benzyl thymine and four trime toquinol molecules and 1:8 VBT:TMQ contains one vinyl benzyl thymine and eight trime toquinol.

After formulating a hypothesis predicting the most effective concentration of the polymer, I began making solutions. I decided to make a 2.5% and a 5% polymer solution per mL of water. After all of the polymer had dissolved in the water, I began the application process by filling a beaker with 100mL of solution, and carefully placing each material square into the beaker for 30 seconds. Each khaki square was then set separately on pieces of aluminum foil and put into the drying oven again at 100˚C. When the khakis were dried, five squares of khaki were treated at 500 micro jewels per cm squared, with the highest energy tested being 3000. Furthermore, I had a control group, which was not exposed to polymer and a group which was given polymer but no exposure to UV light. The UV light causes a cross-link in the VBT:TMQ solution causing the polymer to remain attached to the fabric for long term use. We then organized the khaki squares into five groups based on the amount of UV exposed to each side of the fabric. The fabrics were also washed to remove any excess polymer.

The second part of the experiment consisted of determining the optimal conditions needed for the polymer to adhere to the dye. We made 2% solutions of red and blue dye. We filled a beaker and put a stir bar in the beaker to help the dye adhere to the khaki. The beaker was placed on a hot plate and the stir dial was set to 800 rpm. The khakis were each dipped individually and stirred for thirty seconds in the dye. We changed the dye every fifteen minutes, or after three groups of five had been submerged in dye. The khakis were next washed off to remove any excess dye and sent to the oven to dry at 100˚C.

The khaki squares were categorized by the amount of energy exposure. Each sample was stapled to a piece of paper, scanned into a file and transferred to image J. The program allowed us to attain a color density based on the average of three areas of nine hundred megapixel squares. After every material square had been scanned and processed, a line graph was created using the control and the khaki samples. The graphs indicated that the treated khaki samples' color density was much lower than that of the control.

Our research at the WBIGC will hopefully lead to further investigation on PCBs in khakis and even in printed material. Further research will lay groundwork for finding a green stain resistance chemical for khakis.

The Warner Babcock facility generously provided me with the chance to work in an advanced professional lab. Upon arrival, I felt a sense of disbelief that machines could perform such revolutionary functions. Furthermore, I could not have asked for a better mentor. John Warner is a very inspiring man with a passion for creating safer consumer products. I am so thankful for this once in a lifetime experience; there is no better way I would have wanted to spend my summer.