NATALIA OBRZUT

PH.D. CANDIDATE | CIVIL & ENVIRONMENTAL ENGINEERING

environmental engineering & science

1. Where are you from? I was originally born in Poland. However, we moved to New York when I was one year old and to the Chicagoland area a couple of years later. I've lived in the area ever since and in the city since I was 18.

2. Where did you get your undergrad degree from and what was your major? Do you have a MS? I got my undergraduate degree from Loyola University Chicago. I double major in biochemistry and physics with a minor in math. I got my MS at Northwestern University in environmental engineering.

3. What attracted you to engineering? I have always been interested in hard sciences. I remember in high school taking all of the science AP classes. I love the idea that everything can be explained with some combination of biology, physics, and chemistry. Hence that is why my undergraduate degree was a combination of all the science. When I started at Loyola University, they did not have an engineering program yet so engineering wasn't really on my radar. But once I started looking at graduate students I chose to look at engineering rather than any particular area of science.

4. What attracted you to pursue a Ph.D. in your specialty area? Similarly, to my last answer I knew I wanted to pursue higher education in science. However, it was really important to me to be in a field that could have major impact. Environmental engineering is very unique in that it uses a combination of physics, chemistry, and biology and you have enough flexibility to choose which science you want governing your research. Plus the impacts of environmental engineering could be pretty major including resource recovery and climate mitigation.

5. How do you explain your thesis research to a non-scientist?
Lignin is a major component of the plant cell well. Most people understand that cellulose is a component of plants and that is what is used for paper. However, lignin must be removed in that process and is burned for energy. Or when crops like corn or sugar are harvested the stover or bagasse, respectively, are left to decay in the fields. Our goal is to recover greater value from lignin, which has been historically difficult to do due to a very complicated structure. We treat lignin with the effluent from a wastewater treatment technology to depolymerize the lignin into small aromatic chemicals like vanilla, the flavoring, or flavonoids, which can be used as antioxidants. We also get nanoparticles as a product, which can be used for drug transport in the pharmaceutical industry, in cosmetics as sunscreen, or in agriculture as a means of delivering fertilizer or pesticides. We are also looking at how the source of the lignin and the extraction of lignin from various plant sources affect the downstream products.

6. What attracted you to NU? There were many reasons I wanted to go to NU. One is that I love the Chicago area. I knew that if I had the opportunity to stay here I would. Another reason is that the graduate program just felt a lot more appealing than other universities programs – for example you don't have to take classes while you are researching all five years and you also don't have to TA every quarter. The biggest reason was that I was really interested in Dr. Gray's work and really wanted to have her as my advisor.

Natalia Obrzut

looking at the structure of lignin through the NMR 9nuclear magnetic resonance

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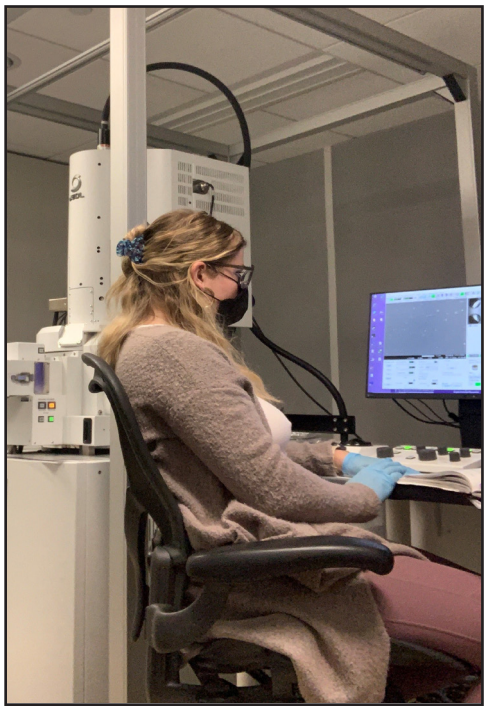
7.What has been the highlight of your time at NU and CEE? A highlight of my time at NU has been the two quarters that I was a lab TA. I have always had a passion for teaching/mentoring and did a lot of tutoring in undergrad. I feel like as a TA I get a bit more responsibility and freedom which I enjoy. I feel like it is a great way to meet younger graduate students and even some of the older undergrads. I really enjoy helping students understand the topics that I am passionate about and hope that maybe it inspires them.

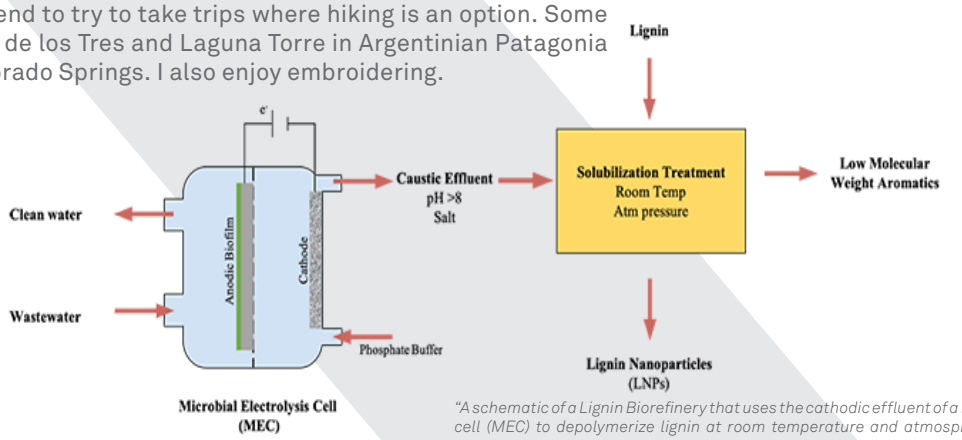
8. What has been the most challenging aspect of your graduate school experience?
I think the most challenging aspect of my graduate school experience has been learning how to communicate my science. Well, first of all, coming in from undergrad, I was terrified of presenting and public speaking in general. Now I typically have to present once a quarter in our group meetings, and present in conferences, and defend my research in my qualifying exam and prospectus, and present at open houses and such. So, I really had to adjust from that fear. And I am happy to say that public speaking no longer makes me anxious which I think is a great skill to have. The other difficulty is that we are so used to speaking in jargon and just having a really technical understanding of our research which may be hard to communicate to non-science people or science people not in my specific field. I took a research communication training program which really helped me in adjusting how I communicate based on my audience.

9. Can you tell us about your experience being mentored or mentoring others?
The biggest mentoring experience I had was my first year of graduate school when the former post doc in our group really introduced me to my current project. He taught me everything from keeping a tidy lab notebook to running experience and analyzing the data. It was a huge help in transitioning from the minimal research I did in undergrad. He was such a great mentor that I try to employ strategies that he used now when I have undergraduates join my project.

10. What are your interests or hobbies outside of your research? I am an avid reader. I love non-fiction books. Mostly anthropology type books. I also really enjoy reading thriller. My really good friend and I recently started a small book club with our friends and we meet once a month and take turns choosing books – which has opened me up to other genres I typically wouldn't read. I think my recent favorite book was Braiding Sweetgrass by Robin Wall Kimmerer. I also really enjoy hiking. I tend to try to take trips where hiking is an option. Some of my favorite hikes have been Laguna de los Tres and Laguna Torre in Argentinian Patagonia and The Broadmoor Seven Falls in Colorado Springs. I also enjoy embroidering.



Using the SEM (scanning electron microscope) to see the structure of the nanoparticles



"A schematic of a Lignin Biorefinery that uses the cathodic effluent of a microbial electrolysis cell (MEC) to depolymerize lignin at room temperature and atmospheric temperature to produce two product streams: low molecular weight aromatic compounds and carbon based nanoparticles."