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Featured Researcher | Amanda Crook

(http://www.tntech.edu/files/research/Featured_Researchers/Amanda2.jpg)**TTU Ph.D. student aims to create simple way to remove contaminants from water**

Summary:

Since 1976, hazardous wastes, which include some heavy metals, have to be monitored from "cradle to grave," and remediated at the end of their usefulness. Amanda Crook is trying to find ways to improve the remediation as she studies for her doctorate in environmental science with a chemistry concentration at Tennessee Tech University.

She is working to make it easier to remove heavy metals, such as nickel, cadmium and mercury, from water. She uses types of binder called ligands created by one of her advisers that attach to heavy metals. Since the ligands can be difficult to remove from water, she wants to find which compounds bind best with resin beads, which are easier to filter. One bead is about the size of a grain of sand. Her plan is to find which binders work best with which beads, so contaminated water can be filtered through them to remove the metals, which can cause neurological and other health problems in humans and other organisms.

Advisers:

Dale Ensor, Chemistry, Chair of the Environmental Sciences Ph.D. program

Ed Lisic, Chemistry

Research procedure, findings:

"Our end goal is to find the resin that works the best to take out on or a combination of heavy metals. What we can do is put them through a system so the water will go in contaminated and come out decontaminated."

Crook attaches ligands, which bind metals in solution to them, to polystyrene resin beads to create a chelating resin. When attached to the bead, the ligands are easier to filter out of water.

Once she has made the chelating resins, she takes them into TTU's hot lab, where she puts metals with low levels of radioactivity in solution. She then adds the resins to the solution and leaves the solution alone for a specific period of time. After the time period has elapsed, she filters out the resins and analyzes the water for radioactivity to see how effective the chelating resin was at removing the metals.

Research application:

"The ligands themselves could potentially be carcinogens, that's why we don't want them floating around in the water. Our end goal is to find the resin that works the best to take out one or a combination of heavy metals."

"What we could do is put them through a system so the water will go in contaminated and come out decontaminated."

Funding:

Student Research Development funding, chemistry department

What motivates you to do this research?

"I've always wanted to do something to preserve our environment for future generations. Water's one of those things that seems abundant when you think about it but then when you actually start thinking about the potable, or drinkable, sources of water, there's not that much so we need to make sure that we do everything we can to protect those water

sources so that we can ensure that we have the clean drinking water that we need to be able to sustain life, not only now but for future years to come."

"This project is new; it hasn't really be done before."

What are your future plans in this research area?

"I am more interested in teaching than research. When I first started college, I was not very interested in science, much less chemistry, and I had to take a required entry-level chemistry course and I had a wonderful teacher who really inspired me and really nurtured my passion for the subject material."

"It was because of that teacher that I stayed in chemistry and that I found my passion in life and what I'm supposed to be doing. It's my dream to be able to inspire other people to love chemistry the way that I was inspired to."

Is this research integrated into classroom instruction?

"When I'm teaching a freshman course, I do try to incorporate this work because it's something if they continue on their chemistry career, they will see. But it's also something that you can talk to them about and you can bring it down to their level."

"It can be a very complex topic to talk about, but it can also be very easy."

What have been the biggest challenges you've faced in this area?

"Definitely funding, with this being a smaller school, we've applied for some outside grants and some outside funding and we usually make it until the end (of the grant process), but we don't usually end up getting the funding."

"I am the only person working on this project at this time, so we're kind of limited to what I can do."

What would your dream research project be?

"My dream research would actually be some type of chemical education research that way you can learn new ways and new techniques that will help students better understand the material they are introduced to. Chemistry has always been taught in a very similar fashion; you have a lecture component and then you have lab work component. A lot of students struggle with the lecture component because they have a hard time being able to understand or retain the concepts."

"My ideal research project would be some type of chemical education project that would try to figure out a better way to teach students some of the topics covered in your general chemistry courses and find new technologies that will make the make the material more relatable to them."

*Last edited **2014.08.15** by **unknown**.*