

HIGHLIGHTS

PhD from MIT in continuous flow manufacturing of pharmaceuticals

Has developed new technologies for continuous flow synthesis including end to end syntheses of several APIs

Contributed to the development of a plug-and-play flow system for automated optimization of organic reactions

SUMMARY

Grace is a leader at Snapdragon, specializing in the development of continuous flow processes.

AREAS OF EXPERTISE

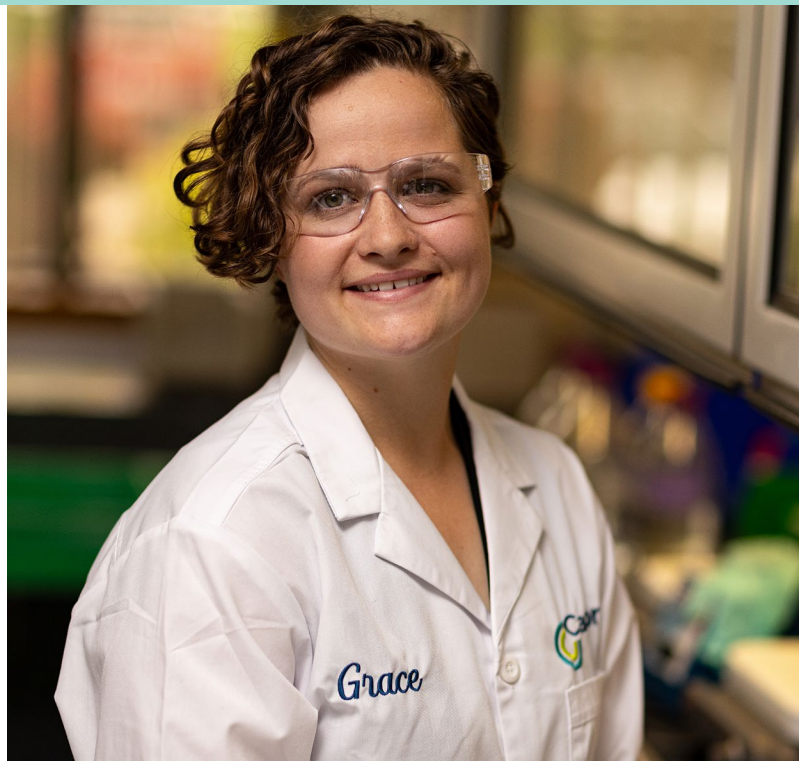
- Continuous flow technology
- Process development
- Early phase manufacturing

LINKEDIN

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What inspired you to get into chemistry?

I wanted to go into chemistry and science in general because I enjoy the technical aspect. I enjoy learning about why things are the way they are and how everything is connected. I went into organic chemistry because I really enjoy solving puzzles and I saw how you put the molecules together as a puzzle and try to make it as perfect as possible with all the pieces fitting together in a seamless way. I also enjoy chemistry over something like a field like engineering because I felt like there was a lot more creativity. The answer isn't really known and you have to figure it out through your deduction skills.



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What skills are important in the work you do?

I know that I like to optimize things and I have a high attention to detail. And so being able to notice every small aspect of a reaction and how that might be important, and how that might be able to answer a question that's required for the process. I like to optimize and perfect a certain process, whether it be for chemistry or things in my everyday life, I really take the same type of approach and I knew that I had that scientific mindset.

What do you like about working at Snapdragon?

I really enjoy working at Snapdragon because they have a fearless mentality. They take a look at process chemistry and they think about how things could be better, how it can be automated, how we can take a new approach to solving these complex problems. It is fantastic to see that philosophy from a company that's excited to take on challenging problems rather than just doing it the same way that we've been doing process chemistry for hundreds of years.

Working at a company that lets you interface with so many different clients, so many different medicines and therapeutic areas, has led me to learn so much more about process chemistry than I would at any specific pharmaceutical company. That's been one thing I've really enjoyed.

What types of clients do you work with?

We don't really have a typical client. We work with big pharma, small pharma. We have a huge growing area of complex synthetics, designer polymers, things that are challenging for a lot of CDMOs to deal with, and we've just fallen back on good process development and that we're unafraid to develop new tools to address problems.

When a new project comes to your lab, how do you start the process?

When we start a project, I like to dig down with the client and figure out exactly what they want from this process. What are your challenges and how can I develop a process that your needs are met? That's really what we're doing as a client-serving industry. I want to make sure that a client has what they need first and foremost. After understanding what the needs are, I can then start evaluating the chemistry and figuring out how it reacts to different stimuli and then figure out how we can meld the chemistry with the client's needs in the most efficient way. A lot of that's listening to how much optimization they need for their current phase, being very sensitive that something can always be more perfect, and understanding when something's good enough and when we can move on.

What makes your team unique?

I work with an amazing team. It's a really young team, which makes the atmosphere exciting. Everyone's excited to work together, they're excited to learn. It's a pretty diverse team. I really value working with people from different backgrounds and different perspectives, and nurturing them so that they can meet their best potential.

What role does automation play in continuous flow?

We try to use automation in different ways at Snapdragon. Lab space for us is quite expensive, so we try to use automation to alleviate some of the tedious tasks for chemists, like running DoEs. We can make an automated system that's going to run a DoE fully automated with an online LC system. We get all of the data points and they're accurate. It allows our chemists to be more productive.

We also use automation to ensure safety. We have a process that we're running overnight. We want to ensure that nothing is going to go wrong and that this system doesn't need to be watched the entire night. We have automatic shutoffs including pressure, and temperature. Whatever data is key for that reaction, we can collect that data and automate it into our safety system. Then there's automation for a very complex system where we need to precisely turn this pump on, wait 30 seconds, turn the next pump on. Whenever you have something that's complex and the system may break if you don't do it precisely in this way, we can use automation there as well. We use it in different ways to solve different problems. I really like the automated reactions. In addition to automated DOEs, we also built a system that does automatic reaction optimization. This is all done with online LC, and then the system just goes from one reaction to the next reaction, evaluate how that performed, then it puts it into a black box optimization system that can iterate through and optimize the reaction.

What makes the combination of Snapdragon and Cambrex so powerful?

I think the combination of Snapdragon and Cambrex is really exciting because Snapdragon's bringing our new technology, Cambrex has the longstanding US manufacturing and European manufacturing for commercial materials, and they have from small scale all the way to commercial. And so now we have the ability to develop these processes and see it all the way to commercial with the clients.

Do you have any advice for the next generation of chemists?

Don't be afraid to go into a field that might seem old, like chemistry. I think there are a lot of new exciting things happening: New ways of developing technology, integrating things that are happening in the world like AI and machine learning, and how we can integrate that into something that seems like an old field like chemistry.

What makes continuous flow such a powerful process?

Continuous flow really allows us to access new modalities that aren't going to be accessible in a batch vessel. We've had processes using very toxic gases that we did a two plus two reaction to make a molecule that would be impossible to use in a batch

vessel, and that was a key part of the molecule for the clients. And without using that technology, they never would be able to access this material for clinical trials. And so it's opening the toolbox of what molecules the med chemists can look at and how maybe we can use things that were considered non-viable to treat unmet needs for the patients.

Who is and was your greatest mentor, and how have they shaped your career?

My greatest mentor has been Eric Fang, the CSO at Snapdragon. He is the smartest chemist that I know, and he understands process chemistry in a way that I don't think I ever will be able to. You can just walk into his office with whatever problem you're having and he will know how to solve it within 30 seconds.

As a chemist, what sets Snapdragon apart for you?

At Snapdragon, the one thing that I really like is our equipment room. You just go into it and it's just every flow chemistry tool that you would ever need, and you just pick it off the shelf, and within a 30 minutes you can have this complex system built in your hood ready to answer the question that you wanted to.

