To: Nakatani Foundation

Nakatani RIES 2026 Final Report

Your name: Avantika Samanta

Your university: University of Osaka

Host lab in Japan: Hayashi Lab

Research mentor(s): Atsuki Nakagami Ph. D, Takashi Hayashi Ph. D

Meaning and Impact of the Nakatani RIES Fellowship: How would you describe the meaning and impact of the Nakatani RIES Fellowship on you?

I would say that overall, I believe the Nakatani RIES Fellowship helped me both become a better researcher and a more independent and adaptable person. Working in a new laboratory and exploring an area of research outside of my previous experience challenged me to quickly learn unfamiliar concepts and techniques, ask better questions, and become more comfortable navigating uncertainty in research. At the same time, living in Japan pushed me outside of my comfort zone in ways that extended far beyond the laboratory, from navigating a new country and language barriers to adapting to differences in academic and everyday culture. Through these experiences and relationships I formed with my lab members, mentors, other fellows, and people I met throughout Japan, I gained a greater appreciation for the value of different perspectives and international collaboration. Ultimately, Nakatani RIES gave me greater confidence in my ability to enter unfamiliar environments, learn from the people around me, and meaningfully contribute, while reinforcing my desire to continue seeking opportunities that allow me to grow both as a researcher and as an individual.

Please complete the following sentences with potential applicants to the Nakatani RIES Fellowship as the intended audience.

- My favorite experience in Japan was...
    - My favorite experience was bonding with and making friends that I will cherish for the rest of my life. I loved getting to know the people in my lab and spending time with them both in lab and outside of lab. I also became close friends with the other GT Fellows by traveling together on weekends and making memories I will never forget. The best part of this program was the connections I made!
- Before I left for Japan, I wish I had...
    - Prepared better for traveling each weekend. I wish I had gone in with more plans of what I wanted to see and do since it got a little hectic planning each weekend. I also wish I brought better materials from home in preparation for traveling, like different clothes or bags to carry around and travel each city with.
- While I was in Japan, I wish I had...
    - Connected a bit more often with JP Fellow alumni and the upcoming fellows. Being in Osaka meant there were no current JP fellows on campus so I mainly only had 2 alumni I could meet up with and hang out with. We got super close towards the end and they were so sweet, but I wish I could have met more regularly during the summer and maybe more towards the start of the program.

Research Internship Overview: *Provide an overview of your research project and your experience during the internship. How did the project relate to your current or future academic interests? What was it like to work in an international research setting? What did you learn from your research experience this summer, and how has it influenced, or how do you expect it to influence, your future academic path or research interests?*

My research project involved studying the interactions between beta-cyclodextrin and potential guest molecules in the maltose binding protein complex. This protein scaffold complex would, down the line, be useful for the design of new metalloenzymes, which are a major area that the Hayashi lab focuses on. This combination of molecules has never been studied in these conditions, so my work was laid the foundation for the lab to use this information for future work in designing these metalloenzymes. Overall, I did a lot of work quantifying the interactions between these molecules, using techniques such as UV-vis or Fluorescence spectroscopy along with protein purification techniques and various analytical analyses to determine binding constants and subsequent changes. Although my current research is more biomedical engineering/electrical engineering focused, my research from high school in design and creation of organocatalysts for peptide synthesis was pretty applicable and helpful for understanding the needed background in chemical engineering. In the future I would like my work in research to be a bit more clinical focused and slightly more translational (so more biomedical). However, I learned some essential experimental techniques throughout my time at the Hayashi lab, such as spectroscopic analysis, SDS-page, E. coli cell culturing, protein purification techniques, and more which will definitely be applicable for my future. This has really solidified my interest to continue doing research in the future while I pursue a career in medicine. I know working in research and collaborating with labs is something I really hope to do and this summer taught me just how important it is, and also the power or cross-country collaborations since not only was I a visiting student from the US but I also met the Hayashi lab collaborators from Germany which was really cool.

Lab Environment Overview: *Describe the lab environment and the personality and working style of your research group. What was it like to work with your research mentor(s)? How would you describe the overall group dynamic in the lab?*

The lab I worked in was very cross collaborative and everyone worked together often. Everyone was super welcoming and nice and when I was new and didn't know some of the techniques my mentor and some other students in the lab were very willing to help me. It is a pretty big lab with lots of PhD, masters, and B4 students, however everyone still seems close to each other. It is split between a more biochemistry side and a pure chemistry side which allows for easy access to machines and materials you might need to use for given experiments. My mentor was an assistant professor in the lab, and he was incredibly helpful and always accessible when he was needed. When I first got to lab he gave me a very good rundown of my project and taught me all of the necessary techniques I would need to complete different parts of it. He was always accessible for questions, but he also let me work independently so I was able to learn on my own and design things on my own but always have access to his input and his opinion on whether I was doing the right thing. He was also very nice giving me advice not only on my experiments, but also on exploring Osaka and Kyoto. Overall, the dynamic of the lab is very tight knit but also efficient since everyone works on their independent projects and when help is needed they are definitely willing to work together, also making sure to have fun occasionally.

Daily Life in Japan: *Describe your daily life in Japan. You may include the people you interacted with outside the lab, food, your housing and living experience, travel around Japan, challenges you faced, and rewarding experiences you had over the summer.*

My daily life in Japan during the week consisted primarily of lab and then a little bit of exploration if I had time. To get to lab I would usually take a bus from my apartment and then walk for around 20 minutes after taking the bus. I would get to lab at around 9:30 or 10 depending on the day and the experiment I needed to run, then I would start my preparation for the experiment. I would get lunch around 12:00 or 1:00 depending on when my experiment was paused or I was done with the first part and I would usually eat with my mentor or other students in the lab and this was nice since I would get to know my mentor and my peers in the lab better and learn more about their lives. For lunch I would usually get food from the nearby konbini or I would go to the dining hall or nearby restaurants with students from the lab. Afterwards I would do more experiments, or I would study up and read some papers for later experiments or plan depending on what was needed and then I would leave lab usually around I would say 5:00 however sometimes it could be later or earlier depending on what needed to be done. Afterwards, in order to explore Osaka more I would actually take a bus to some random station and either go somewhere from the train station or I would stay at the station and try a new restaurant or look around. Then I would come back to my apartment usually by bus and that would complete my day. I will say sometimes my transport to and from lab would get difficult since the bus came every one hour so if I missed it, I would have to walk around 40 minutes. And in the weather walking in the rain was sometimes difficult but I got lucky with the weather in Japan, however in general I think having a bike could have been helpful since I know two other people had bikes and it helped them, so transport was mainly the only challenge I had. On weekends I would take time to explore and travel different parts of Japan and each weekend was different me averaging a train or bus or sometimes even a plane to a different location and exploring a new part of Japan and on those weekends my schedule is never really the same, but it was always very exciting. I would say some of the most rewarding experiences I had this summer were both in my week-to-week life in lab, getting to meet and interact with new people and making some lifelong friends while also learning about a very interesting research topic, and on my weekends getting closer to the Georgia Tech fellows and exploring many different parts of Japan.

Experiences with Japanese Culture: *Describe your most meaningful experiences with Japanese culture. These could include program activities, interactions with people in your lab, or experiences from daily life that you feel illustrate aspects of Japanese culture or values. What did these experiences teach you about Japan? What did they teach you about yourself?*

Some of my most meaningful experiences with Japanese culture came from having the opportunity to learn about Japan through its history, traditions, and everyday life. One particularly memorable experience was the trip organized by the foundation to the Edo-Tokyo Museum and the samurai experience, where I was able to learn more about Japan's history and how it has shaped aspects of the country today. I also really valued visiting temples and shrines in places such as Nikko, Kyoto, and Uji. Participating in cultural activities like a traditional tea ceremony helped me better understand the customs and values associated with these spaces rather than simply experiencing them as a visitor. At the same time, exploring major cities such as Tokyo and Osaka with both my friends and members of my lab gave me a different perspective on Japanese culture through everyday life. I became much more aware of cultural

norms such as being quiet and considerate in shared spaces, maintaining cleanliness, and the organization and efficiency of public transportation. I was especially struck by how much consideration for others seemed to shape daily interactions, from behavior on trains to how people treated shared public spaces. Together, these experiences taught me that Japanese culture is deeply connected to both respect for tradition and consideration for the surrounding community. They also taught me to be more observant and adaptable myself. Being in a culture different from my own encouraged me to pay closer attention to how others behaved, understand the reasoning behind unfamiliar customs, and become more comfortable adjusting to new environments rather than expecting them to operate in ways that were familiar to me.

Returning to Japan: *Do you plan or hope to return to Japan in the future? If so, what would you like to do? What would you need to make that happen?*

Yes, I definitely want to return to Japan in the future. Although I have no set plans currently I know I want to go back for sure, but it would likely be more for a vacation situation. I want to explore some of the cities further since a weekend wasn't always enough to see everything I wanted to see. I would also like to reconnect with and meet up with people from my lab and the JP alumni that I became friends with. It would be nice to explore places I already did and go to newer places. I make that happen I would need proper time and some money as well to plan accordingly, but I would be really excited to go back to Japan!