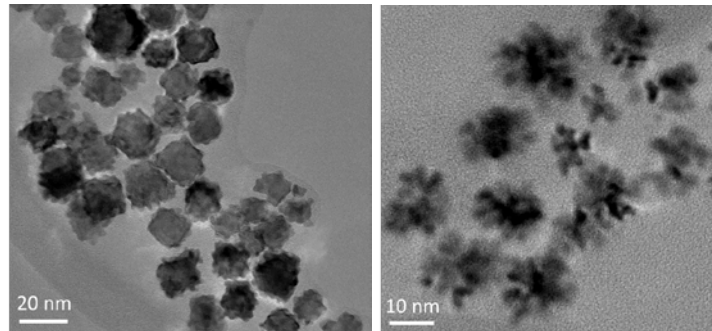


# Study and Contribution in MIT

Department of Chemical Engineering, Shusaku Asano

## 1. Small particles made in small reactor

I've conducted the study in the Klavs F. Jensen research group in MIT. His group focuses on the precisely controlled chemistry in small devices like several inches width chips. Restricted small space enables us to not only control temperature and pressure easily but also produce valuable chemicals on demand. I aimed to produce functionalized alloyed nanoparticles using high temperature and pressure created in the small tubes. Pictures below show successfully obtained particles.



A spiky ball like particle is the alloy of platinum and palladium. A dendritic particles on the right is the alloy of platinum and ruthenium. Both structures are engineered in order to make an excellent catalytic activity with large surface areas. This project is in a collaboration with Dr. Victor Sebastian at the University of Zaragoza. I'd like to tackle on revealing the mechanisms and precise synthesis of a variety of composition, size, and shape in Kyoto University.

## 2. Rely on others with independent will

During my stay, I found the most important two ideas for successful study in MIT. These are “willingness independent from supervisors and coworkers” and “asking others for help.” They are not paradoxical but surely related.

Prof. Jensen gave me pointful advice but never ordered concrete procedure or specific experiment. It was not only for me. Regular Ph.D. students also never receive orders to do. In this situation, each individual must propose what he/she wants to do for starting a discussion. In Kyoto University, hierarchical relationships of “Sensei - Gakusei” and “Sempai – Ko-hai” dominates lab. In MIT, all members are equal from a student in the 1<sup>st</sup> year to a visiting professor. There are only flat relationships. On the shiny side, a scientific opinion is accepted regardless who said it. On the dark side, older people don't

give a lecture or a proposal to the younger. Students must have their own willingness and find research theme of themselves.

Postdocs in the group have a wide range of academic background from organic chemistry through mechanical engineering. When I had a trouble with my experiment, I asked advice to the one who seemed to have the solution for my problem. In most cases, problems were solved instantly with the deep knowledge and kindness of them. The key for this approach is to clarify what I want to do and what I don't understand.

In the context of MIT, to have your own willingness and aim is the key to asking others for help, and to ask others with the knowledge and skills is the key to realizing what you want to do.

### 3. True and False with MIT and studying abroad

I'd like to describe miscellaneous regarding MIT and studying abroad through the discussion of true and false of some beliefs in Japan. Note that these are based on my limited experience and not guaranteed generality.

Belief 1. Students in MIT are all genius and work hard for their study

This is false. They are wise and nice though, not so different from students in Kyoto University in terms of cleverness. Graduate students in Kyoto University seem to stay longer in their labs than ones in MIT do.

Belief 2. Classes in MIT are completely different in quality from ones in Japanese universities

This is partially true. I attended a class about Energy technology and policy every week. The style of lectures was almost same as the one in Kyoto University. The differency was in the Q&A. Students ask questions in every 5-10 minutes. The professor takes his time to answer all the questions. It's not one direction. Both students and a professor did their best to make the lecture interactive.

Belief 3. Staying abroad is very effective to improve language skills

This is false. Communication skill would be improved through discussions in lab. Nevertheless, general language skills such as the accurate grammer composition, a range of vocabulary, and appropriate pronunciation are improved little with daily lives. Actually, there are some students in their 5<sup>th</sup> year with a thick accent.

Belief 4. Talents in all over the world gather MIT

This is true. Members in the Jensen group are from literally around the world: Denmark, Italy, Iran, India, China, South Korea, Thailand and Mexico. In addition, they have diversity in their careers and ideas.

#### 4. Did I contribute to MIT?

One of my goals of this stay was to contribute to MIT community because it is essential to sustainable and profitable relationship between Kyoto University and MIT. Here, I'd like to summarize what I did and whether it worked or not.

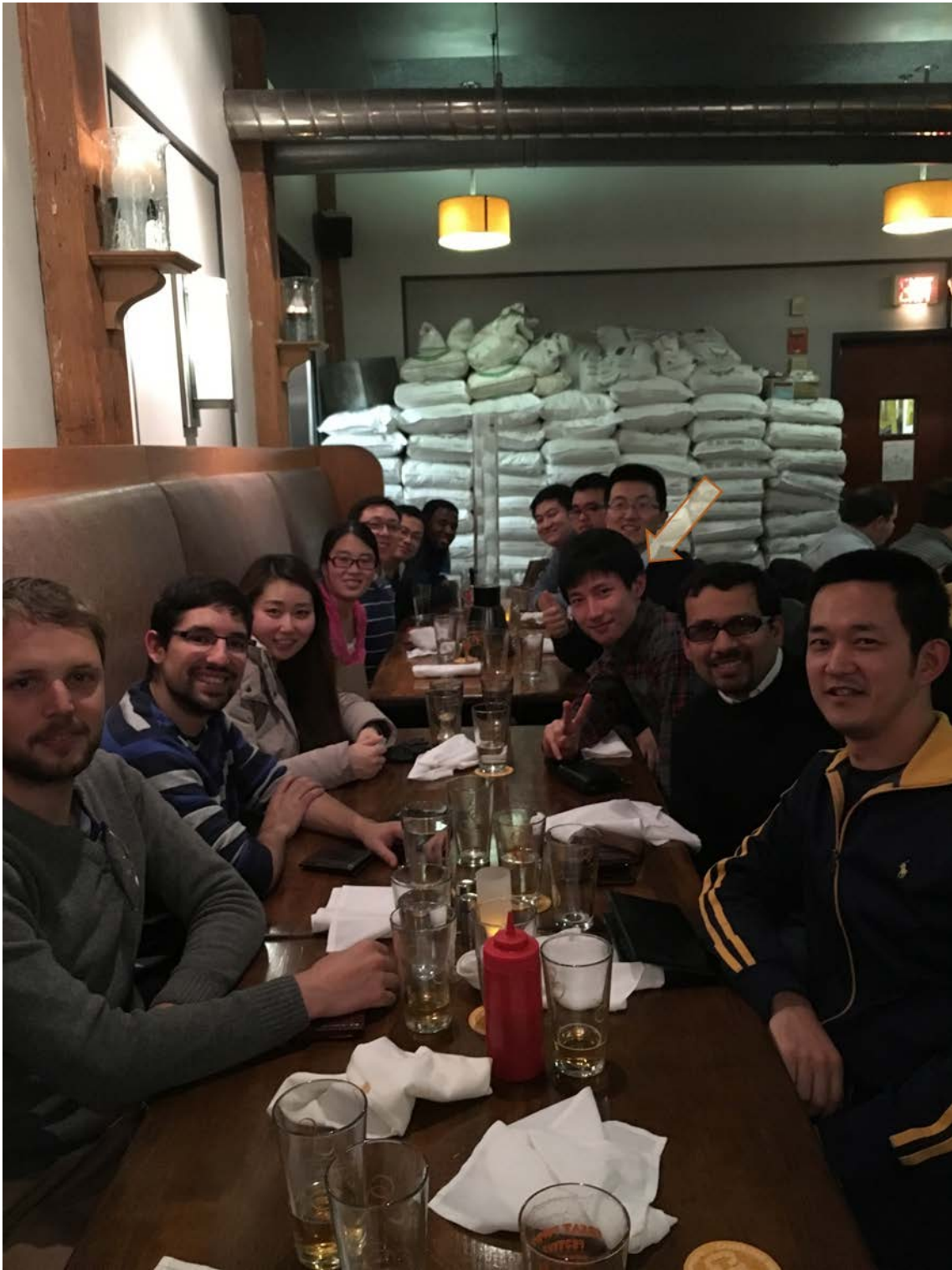
The first thing I dreamed was to make wonderful scientific discovery in MIT. I can say that I did my best. Even so, my project is still in the developing stage. I'd like to make a great progress in Kyoto University and make a contribution.

The second thing I tried was to give new ideas to the MIT community. To do so, I asked questions at the group meetings and lectures, as many as possible. Actual numbers of questions I did were six in the group meetings and 15 in other lectures in MIT. As a result, postdocs and students in the lab regarded me as a good interactive listener. They started to offer me comments for their presentations. It was a great pleasure for me.

The last thing I tackled was to make friendships with many people. This might look primitive whereas it is the most important. I think the source of innovation in MIT is not the facilities and money but the diversity and the network of people from all around the world. If so, I can contribute to that network through becoming friends with many people. Actually, it was not so easy because of the conversation skills needed but I could make some intimate friends finally. Lab members kindly held a farewell party for me on the last day of my stay. I'd like to keep in touch with them and make the network stronger and wider.

#### 5. Acknowledgment

Here I express my thanks to Prof. Klavs F. Jensen for hosting me at MIT and having productive discussions every week. I appreciate JGP-CPIER and John-Mung program for the financial support.



At the party in January



At the farewell party for me