# MIT Tour Report

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## 0. Overview

I visited Massachusetts Institute of Technology (MIT) on March 26th and 27th. Dr. Frank Leibfarth (Jamison Lab.), Nopphon Weeranoppanant (Jensen Lab.) and Brandon Reizman (Jensen Lab.) guided us in their laboratories on 27th. I report state-of-the-art devices and studies. Then, I discuss the main differences in MIT and Kyoto University in terms of academic systems and environment for students.

## 1. Jamison Lab.

Jamison Lab. was huge and beautifully arranged by sections. Laboratory space and offices were clearly separated. There are a lot of integrated organic synthesis systems using syringe pumps, reactors, membrane separators, IR analyzers and computers. 12 postdocs are studying there. Only two of them have their own fellowship and others are hired by the project budget. Projects vary from Novartis's "free hand" project to collaboration to other chemistry and chemical engineering laboratories in MIT. Talented postdoc like Frank gets enough funding and good projects. If not, they have some trouble in doing their own research.

## 2. Jensen Lab.

Jensen lab has two floors and conducts researches all about the micro chemical systems. The study area covers from reaction engineering in a micro space, separation processes, biology, and micro total analysis systems (μTAS). About ten students and postdocs kindly explained their studies and experimental devises. They utilize standardized devices and integrate them to independent chemical processes by their skills. Devices vary from tiny tips as in Fig.1 to A4 size plates made by Corning. One student was making microchannel by a 3D printer. The material was polypropylene and he didn't use supporting materials. I also make acrylate microchannel by an inkjet 3D printer and have some trouble with supporting materials. His advices and knowledge were very helpful for me. According to him, the technic for fabricating channel without supporting materials depends on the model materials.

Another interesting topic was provided by Dr. Sassa. He received his degree from Tsukuba University in Japan and now doing a postdoctoral study in Jensen Lab. He said that the most distinguished point in MIT is the students' engineering spirit and faculties support for technical issues. He also made beautiful μTAs that can storage, analyze, wash, and react chemicals with the help of technicians in MIT. The microchip with dozens of tiny tanks and actuators was precisely fabricated and worked very

well. He said that devices in MIT are not better than those in Kyoto University but the supporting system in MIT is amazing and every student utilizes them and drive their research efficiently. He used food additives and whiskey for chemical reagent in order to treat in office space as in Fig.2. The whiskey he introduced turned out to be my souvenir for my parents.

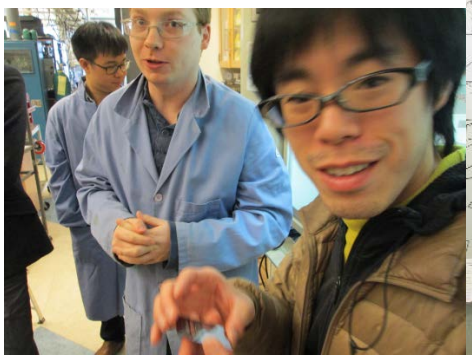

Fig. 1 Yoshihiro has microchip made of silicon carbide (Left)
Fig. 2 Dr. Sassa with his “reagent” (Right)

### 3. How to Survive in MIT

I exchanged information about lives in both countries with Frank and Nopphon. The high rent in Boston surprised me. Frank pays $2500 a month with his wife. Dorms cost $500 but there is not so much opportunity to get in. According to Frank, graduate students get $2000-2500 a month as RA and TA but over half amount disappears for rent. Some people say that there is an educational inequality in the U.S. due to the difference in income. I understand what that means. It is very difficult for young people without enough financial support to live in Boston and spend their lives in Harvard or MIT. Money is the most important thing for professors too. Every faculty member, even a new assistant professor has his/her own laboratory in MIT. Frank said that if you cannot get enough money to hire postdocs and to manage your laboratory, the laboratory gradually shrinks and disappears in few years. To get money is the most crucial to survive in MIT for every people.

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