

1. 訪問期間 2019/12/02~2019/12/15
2. 訪問大学 Vellore Institute of technology University (VIT)
3. 概要

- ・訪問目的

インドの大学との交換留学プログラムのため。

- ・講義

安全工学、高分子、プロセス計算などの講義を受けた。授業は全て英語で学生は積極的に授業に参加しているイメージだった。皆意識が高く、発言を我先に、と行っていることに刺激を受けた。内容は日本で大学 2,3 年までに学んだものが多かった。

- ・研究

人工の糞便、尿のマイクロ波を用いた乾燥後の重量測定を行った。電子レンジを用い、糞便と尿の比率やワット数を変えることによる重量の変化を測定した。

- ・学生交流

授業後やお昼休みに一緒にご飯を食べに行ったり、休みの日にはお寺やドライブに連れて行ってもらったりした。10 日間という短い期間だったが、とてもよくしてもらい帰国から 2 か月たった今でも連絡をときどきとっている。インドに行って一番良かったと思ったのが、皆さんに温かく迎えてもらえ、学生や先生方とたくさん話せたことだと思っている。

- ・文化交流

先生の知り合いの結婚式にも参加させてもらった。日本でも結婚式に参加する機会は滅多にないのに、とても貴重な経験になった。日本の結婚式と全く異なるインドの結婚式は大変興味深かった。また、先生の家に行ってもらい、インド式のご飯を作っていただいた。

- ・感想

私は日頃からよく海外に旅行に行くので、今回も無料で行けるなら…との思いで参加したが、帰ってきた今、本当に行ってよかったと思っている。VIT の学生は皆が皆一生懸命自分のやりたいことを行っている様子を間近で見られたことでとても刺激を受けた(例えば、授業があるために、夜の 9 時ごろから実験や議論を始めていた)。10 日間たくさん英語を使い、語学的にも有意義なものになったうえ、普段とは異なる分野の研究を自分なりに必死に頑張り、10 日間ではあったが成長できた気がする。なにより、VIT の方々、関わった頂いたすべての人によくして頂き、感謝でいっぱいである。インドは人がよい、と何度か聞いていたが、その通りだと思った。必ずインドに、VIT に再訪したい。来年の VIT での学会に参加するためにもまずは日本でインドでの 10 日間を活かしつつ、頑張りたいと思う。

Report on the exchange program in India

Yokohama National University 4th

Now, I describe what I did at university and what I did off university in India for 10 days.

First, I explain what I did at university that is SEM, FE-SEM, taking classes and some experiment.

First three days, I learned about SEM and FE-SEM. I've never learned about SEM before I came to India. So this is the first time to use SEM. SEM is a microscope for analyzing the percentage of elements contained in the sample. By changing magnification, focus and stigmator X, Y, you can focus on the target. The samples analyzed this time were metal and rubber. You should measure at least three times, changing magnification or observation point. Next, I describe about FE-SEM. Unlike SEM, FE-SEM uses a field emission electron gun. How to use FE-SEM is almost same as SEM. The professor taught me how to use and then let me use. So I was able to understand easily how to do it.

The other days, I took classes and did experiments. The experiment I did was microwave drying kinetics. Microwave is electrostatics force and act on water. When microwave is given, water gradually evaporates. The purpose of this experiment is comparing wet weight and drying weight that is, removing the H₂O. First, I used waste, and conducted with different wattage, 300W and 450W. This time, moisture content is 100%, weight of the biomass is 50g, weight of water is 50g and time is 30s. When time and weight are graphed, the slope of 450W is larger than that of 300W (figure 1). In other words, the moisture disappeared earlier at 450 W.

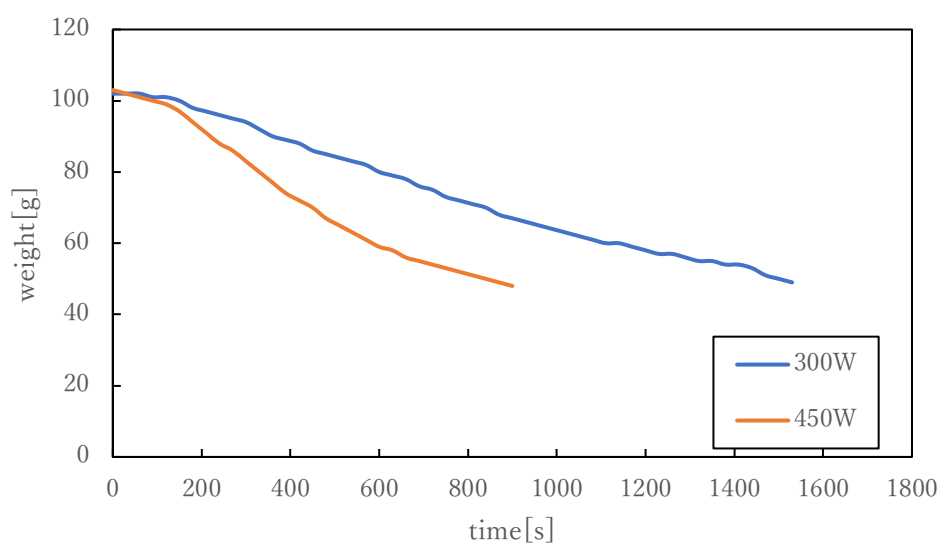


Fig1. time vs. weight(waste)

And next, I did experiment by using artificial urine and feces. First, I prepared experiment. I used miso paste, east, oil, glycol, cellulose, and so on, to make feces. And urine was made from NaCl, NaH₂PO₄, Na₂SO₄, KCl, NH₄Cl, water. Feces are fermented at 30 degrees a day and then completed. Urine is kept cool in refrigerator. Next day, I did experiment. As before experiment of waste, I used microwave, and warmed every 30s. Watt is three conditions of 100W, 180W and 300W. And also changed the ratio of urine and feces. The ratio of feces and urine is each 9:1, 8:2, 7:3. I show all date in fig2. MR is Moisture Ratio. It is the ratio of the initial amount of moisture present in the sample (M_0), to that at given time (M_t).

$$MR = \frac{M_t}{M_0}$$

The measurement time is different because I stopped to heat when it was burned.

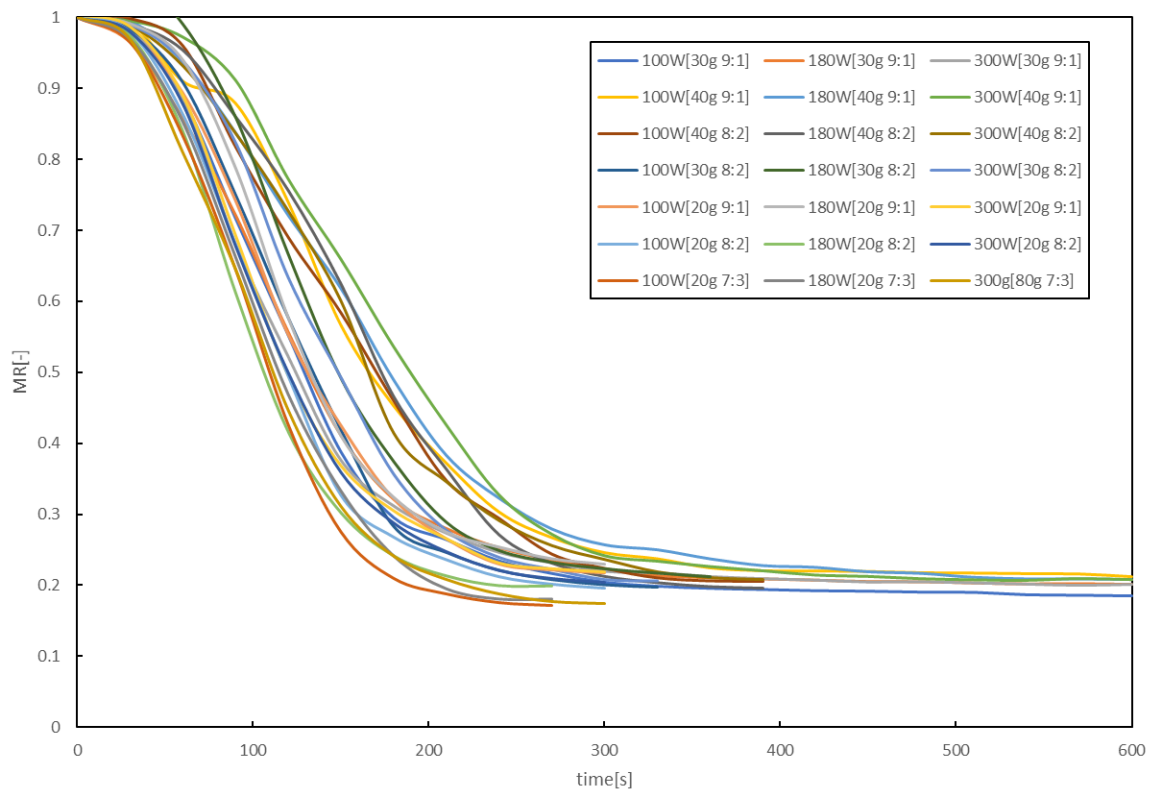


Fig2. Time vs. MR

As shown in fig2, I found almost data are the same behavior. If you look closely, MR is the lowest when the ratio of feces and urine is 7:3, then the highest when the ratio of feces and urine is 9:1. This is because the amount of evaporation increases as the amount of water increases. Comparing in watt, I feel almost no change in MR.

However, I think the accuracy of this experiment is not enough. First, the number of experiments was small. I did 21 times of experiments in total under different conditions. I have to measure at least two times on the same condition to make reproducibly better. Second, it cannot be said that weight of urine and feces was not completely exact. This is because it was often that mixture of urine and feces swelled and overflowed from the container when I heated up with microwave oven. And the overflowed mixture attached to the microwave oven and my hands, then weight decreased. We should have done experiment with larger container.

Finally, I'll write about classes I attended in VIT. I have taken almost same contents of Indian classes in Japan, but it's difficult for me to take in English.

About hazard and safe, I learned "taking a risk is what you do it or decide not to do it". If I live every day, I have a lot of risks. Considering on researches, it is important to Reduce risk. Therefore, we should respond according to the situation, whether do it or decide not to do it. As a researcher, I should always consider safety.

About process calculations, there were some units I used for the first time. I converted foot or gallon and other uncommon units to common units.

I also learned about cellulose and took in fieldwork class. I learned a lot not only contents of classes but also how students should be in classes. I was impressed that Indian students actively answered professor 's questions. In Japan, most of students don't react, so I think they are not aggressive. I must be very grateful for being stimulated. Japanese people have a culture that values collectiveness. We tend not to do what others do not. It may be difficult, but I want to try to speak even if only slightly in a class.