

International Internship Program

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First, I'd like to appreciate very much the support from international coordinators, people around me and all of people in Thailand who I associated with. I could get so many experiences during staying in Thailand. I'm so glad to take this program because I thought that I couldn't go to study in overseas due to student of science course.

Thanks to this program, I could meet many people. So, this experiences and meeting is surely tangible and intangible property for me.

In this report, I report on some experiences of staying in Thailand and my research in Khon Kaen university. They're about Khon Kaen university, people in Thailand, my living, feeling, learning, good and bad points, and, after this my future.

First, I introduce about Khon Kaen university and city.

Khon Kaen university has 18 faculties, many eating places and cafes, apartments, banks, post offices and markets, and is so large like one of town. We usually use motorbicycle or car to move in the university. Furthermore,



Picture.1 This is main gate of Khon Kaen university.



Picture.2 This picture is building of faculty of chemistry. I stayed here almost time.



Picture.3 This is small party for me after my presentation. These people same laboratory

people of the university can use hospital and clinic for free.

Around the university, there're many restarunts, apartment, goods stores, and convenience stores, and places like as small temple where we often are prayed in. Thailand people make it a hobit to pray at the place. I've prayed with my friends a few times. I got a funny impression.

Beside the university, there's national road, I often used this road to go shopping and city.

There's my apartment out of the university, it takes about 5 minutes to go to the university by motorbicycle. At first, I had felt worry to live in the apartment because there're hole on the ceiling of bathroom, no air conditioner, and refrigerator. Futermore, cockroach has appeared in my room at first day. And I made my room break down because of my mistaking. I'm worried about the future.

But, porter of Thailand has helped me many times during I stay Thailand. She let me move to other room which there're air conditioner, refrigerator, closet, some chairs, and TV in. And, I've asked her some questions. I'd like to say her thank.

My living in Thailand was very hard for first two weeks. One of the terrible things is that I couldn't listen what Thailand people say. Because it's defference from Japanese pronunciation. I thought Japanese english was rightly. But I've known that there're habits of pronunciation in any countries. At first, I've worried so much about this pronunciation. Thailand people around me could speak better than me. Because they always gave their presentation in English. I felt that they are very conscious of



Picture.4 This picture is in shop of fish in Khon Kaen university. It's one of the unique shop.



Picture.5 This is my living apartment.

speaking in English, and that there be big difference between Japanese and Thailand people.

So, I thought it's trouble for Thailand people. But, Thailand people is so kindness for me, spoke slowly, said repeatedly, and told me the spell which I didn't understand. By thanks to that, I gradually understood what Thailand people say.

So, I felt difficult to communicate with people who don't understand the language. And, I felt important to communicate with people whom I met at first. Because I felt nervous about meeting at first, so I couldn't almost

talk to people of Thailand. I should try to talk to people of Thailand so much, even if I couldn't understand language.

I thought I should have studied more, and have made the move first. I always couldn't notice early, but I could know it by the internship program. I learned the importance of making the move first to talk someone and it's difficult for me to do it. So, I'll hard try to make the move first.

There's a thing I thought by staying in other country. I thought English class of junior high school and high school in Japan isn't very good. Because the class is deflected to one side of grammer, not conversation. Absolutely, grammer class is important, I think. But, should change how to teach in the class if Japan will make forays overseas in search of bigger profits, I think. If it will be able to change, young generation of Japanese will be to make a grand entrance into the world.

One of hard things by staying Thailand is management of my physical condition. I've got the trots something awful. I thought the cause is drinking of beer and Thai food which is used



Picture.6 They are my seniors who have taught me about my experiment and taken me various places.



Picture.7 They are my Japanese friends who met at first in Thailand.

many spices. This diarrhea hasn't made me good by Japanese medicines. So, I have continued it for a few days.

My Japanese friend, which they're internship student of Nagaoka technical university, staying Thailand at the same time and they live same dormitory often have caught a cold during I staying Thailand. I couldn't manage my health though I would be careful so much.

I first thought that foreign medicines is feared because foreign medicines is strong effect for Japanese. But actually not at all. Thanks to take Thailand medicines, I was so good quickly. Thailand medicines is made to fit health of Thailand people, so Japanese medicines didn't effect well, I thought.

And, to my surprized, it's free for student of Khon Kaen university to consult with a doctor in academic medical center of Khon Kaen university. My friends in Thailand recommended me to see a doctor. I went to a doctor with my coordinator, but to tell my symptom and listen doctor's questions were so difficult, it was hard for me.

However, this experience is great for my future. Because I could consult a doctor without so much anxiety if I might work in overseas long time in the future.

As the result, thanks to go to a doctor early, I could be good and spend healthy.

After two weeks since I stayed in Thailand, I was accustomed to live in Thailand, eat Thai food and listen English. I could talk with Thailand friends, told some jokes each other, asked some questions about my experiment. I'm growing enjoyed this life. Because Thai friends talked to me many time, asked me many questions, and took me various places in Khon Kaen, I could be accustomed to.

my friends took me many temples, markets, resturants and sightseeings. In Thailand temple, they politely tought me many things, how to pray, action and history of the temple. Thailand people care about praying. They went to pray several times a week, taking me to pray together. There're many place which is small temple to pray in Khon Kaen



Picture.8 This is one of the most biggest Thai temple in Khon Kaen. This temple is nine-story building.

university, and many student and others pray there.

The places made me feel all funny when I prayed there. I don't know the reason, but I thought Thailand people are kindness and peaceful because of praying regularly, so I'd like to emulate their behaviors, and keep on the safe side.

I have learnt many things in this program, especially, one is to understand myself a little bit. I think that it's the most important thing for me to find it. It's good that I anew could find a part of myself, though I thought I knew myself.

That's my non-good and good points in overseas. First, it's that I don't have self-assertiveness too much. Though it's often said that Japanese be poor at asserting oneself, I thought I was the typical type during staying Thailand. I ususally assumed a passive attitude.

Actually, I'd like to have attitude of activeness, but I couldn't do it because I don't speak English very well, and felt embarrassed.

I often said "anything" when my friends asked me what would you like to eat, where would you like to go. It's not problem, but I always shouldn't do like this. What would I like to do, How would I like to do, I should communicate them, I thought. In overseas, self-assertiveness is very important to work, study, and live. Because it's natural for foreign citizen. Certainly, my attitude is one of the personality of Japanese, but I thought in the future we should be more assertive for Japanese business.

Futhermore, though this is about my experiment, I couldn't confirm too much. For preparing my study, I consult with my seniors about process of experiment. I wanted to use something, but they said "asking other" and "I don't have it". As the result, my



Picture.9 This picture is scene of nine floor of the temple.



Picture.10 This is the most biggest night market in Khon Kaen.

study must be advanced without using it. When I asked later, actually she who I asked at first had it, could lend me it. Because of this, my samples were without any credibility, and didn't obtain good results.

In this environment, communication and confirmation are more important. If I couldn't speak in other language very well, I should always be careful to work. It's great for me to notice how important this one is for working in overseas. I learnt my demerit, and could confront what is wrong. Thank to know it, I could improve the character in usual day, adopting to confirm carefully, finely, and exactly things, for example they're duties expected at first by boss. If I could have a consciousness of them, I thought I surely become successful my work.

Trying this program, making much effort for passing the selection, and Taking part in this internship would be meaningful time for me. The internship made my future vision, and let me stimulated because of the presentation in English about my experiment in Thailand.

My presentation was not good, and I could find the difficulty of presentation. In usual days, I casually have given presentations about my study by speaking Japanese until now, and I didn't make all kinds of efforts too much. However, it's so difficult to give the informations, kee passages, and what to do by speaking in English. I should try to make all kinds of efforts after this.

And, I could see my future vision a little when I've given the presentation. It's my dream and pabulum. I could get them, I thought it surely would be intangible property.

I'd like to introduce about presentation of my experiment in Thailand. I could consider various things about the experiment though I don't major it. And, in the laboratory, there're not many instruments and equipments, so I couldn't experiment in good environment. However, if the condition is so, I should consider elaborating equipment for the experiment.

The theme is synthesis of nano porous TiO₂ by anodization.

Introduction

TiO₂ is of great practical importance particularly in health-, energy-, and environment-related applications such as dyesensitized solar cells, drug carriers, and self-cleaning coating due to its nontoxicity, chemical and physical stability, and photocatalytic capability.

Recently, there is great interest in nano porous TiO₂ of light energy conversion materials such as dyesensitized solar cells. And in this laboratory, actively work about photocatalyst. So, I focused on photocatalytic capability of TiO₂. Purpose of my experiment is synthesis of TiO₂ by electrochemical method and studying about electrochemistry and TiO₂.

There're some synthesize method of TiO₂, however, in this time I synthesized TiO₂ by anodization method.

Because, one of the advantages, it's available as doped with third element to TiO₂ by selecting the composition of the electrolytic bath. By this way, it's can be to modify the band structure of TiO₂.

Second, it's possible to avoid the problem, which TiO₂ is separated from the substrate in high joint strength between the oxide film and substrate because of equilibrium reaction to proceed thermodynamically.

Third, it's possible to control film quality including organization of the oxide film and crystal structure by selecting electrochemical conditions(forming voltage, current density, electrolyte composition, and pH) in order to occur competitively between dissolution and the oxidation.

So, I report about synthesis of TiO₂ by anodization method and the result of analysis.

Experimental method

Samples are used Ti and stainless steel. Size of Ti foils is 0.50 mm thick, square 20 mm on a side.

Oxalic acid and ethylene glycol are used as electrolyte. Concentration of oxalic acid solution is 10 wt%. Conditions of the ratio in weight is five. It's from 100 versus 0 to 20 versus 80. Synthesize process is like this. First, mechanical polishing. Second, anodization. Last, analysis of surface by SEM.



Fig.1 Picture of SEM (HITACHI S-3000N).

This is picture of equipment of mechanical polishing.

Features of mechanical polishing are low cost and small risk. But, I couldn't get smooth surface of TiO₂ by mechanical polishing. The surface is inhomogeneous because the samples aren't flatness. I think, in general, we could get more smooth surface with using more than one method of polishing. For example, mechanical polishing and chemical or grind stone polishing.



Fig.2 Picture of equipment for polishing

Furthermore, the smooth TiO₂ actively occur reaction with air because Ti don't cover with the oxide. So, I think it's better to keep the sample in vacuum after polishing than in air.

This is schematic of anodize equipment. I used Stainless steel as counter electrode, and Ti as the working electrode. Time and voltage of anodization are 1 hour and 30 V. And, distance between anode and cathode is about 1 cm due to be better reactions than far distance.

One surface of Ti foils weren't covered with epoxy resin, and not rinse Ti foils in acetone. No polishing side contains the oxide, organic matter and some dirty. So, they will be induced chemical reactions in electrolyte when Ti foils and cooper wire don't be covered with epoxy resin. Especially, cooper wire is dissolved by electrolyte, and cooper ion responds. cooper ions affect in making TiO₂ by anodization. I should do coating with epoxy resin because epoxy resin protect the other side of TiO₂ and cooper wire. Furthermore, I should rinse in acetone due to clean the surface of Ti.



Fig.3 Cooper wire of the sample of TiO₂ after anodizing covered with light blue reactant.

Result of analysis

These images is surface of TiO₂ by SEM.

The image of 100 oxalic acid and no ethylene glycol, the surface don't have many porous. And the surface of TiO₂ is totally not smooth.

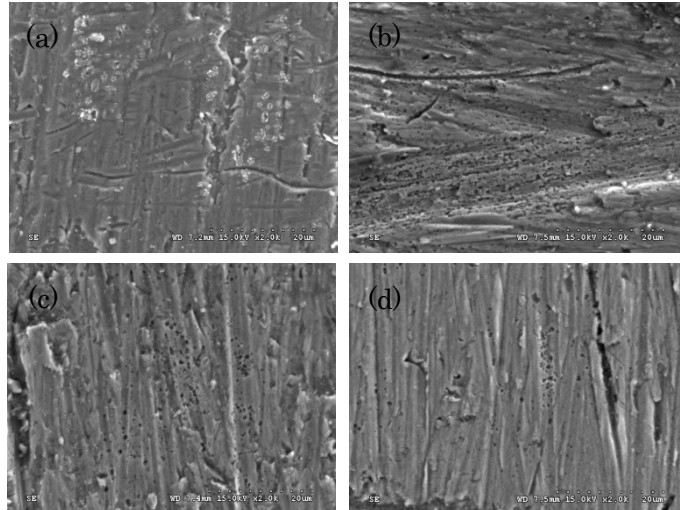


Fig.4 These images is surface of TiO₂ by SEM. These images consist of ratio of oxalic acid and ethylene glycol (a)100:0, (b)80:20, (c)60:40, (d)40:60.

The image of 80 oxalic acid and 20 ethylene glycol, the surface comparatively have porous. But the pore is present partly, not totally. Futhermore, size of the pores is inhomogenous.

The image of 60 oxalic acid and 40 ethylene glycol, the surface don't have many pores. The pores is present party.

The image of 40 oxalic acid and 60 ethylene glycol, the surface is similar to condition 3. The surface don't have many porous.

This image is 20 oxalic acid and 80 ethylene glycol, the surface have best state in all sanple. the surface has many pores and pores be present homogerous. I think size of porous is mostly constant, but I didn't investigate about size of porous, not sure.

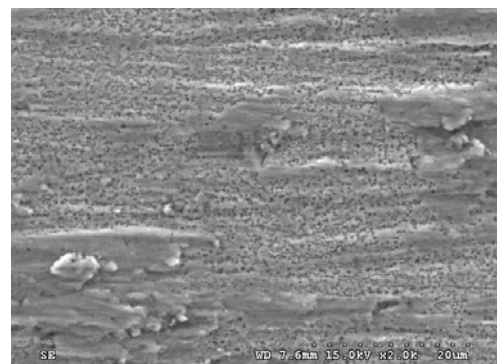


Fig.6 This image is 20 oxalic acid and 80 ethylene glycol.

Reason of no porous TiO₂ in 100 oxalic acid may be not contained ethylene glycol. ethylene glycol has moderate viscosity, and could make wetting on electrode area, penetrating pores of TiO₂, fast moving of ions in electrolyte. Futhermore, one of the reason is that oxalic acid is weak acid.

However, I think that one of the most important factor is polishing, not electrolyte ratio,

oxalic acid, ethylene glycol. Because I couldn't get smooth sample. My sample is a little bending, it's not flatness. So, in this case, all of my sample is not same condition, because some of the samples may be not enough polishing. If I could get smooth sample, I might be able to get many porous in other condition.

So, if I have time so much, I should do experiments about same condition and same electrolyte ratio. I mean I should approach the experiments from various direction. And, I should get repeatability. For example, the condition is electrolyte in 20 oxalic acid and 80 ethylene glycol and mechanical and chemical polishing or only mechanical polishing. In only mechanical polishing case, changing time of polishing, it's 5 min, 10 min, 20 min 30 min, and 1 h.

By this way, it's clear mechanical polishing could get smooth sample and is important factor, or not.

I thought this experiment is so difficult to control nano porous TiO₂. Because nano level controlling be careful so much to make the sample of homogenous size pore, I think. So, I should decide the detail of experiment method.