

Report on European Summer School & 2nd Japanese-German Student Workshop

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European Summer School was held in Physikzentrum Bad Honnef from October 4th to 11th and 2nd Japanese-German Student Workshop was held in Ruhr-University from 12th to 14th. In European Summer School, the first day started from a basic lecture of the plasma physics. It started from the explanation of the generation principle and usage of the plasma in the first class, I heard that the character of the electron and the ion in plasma (plasma frequency and minimal collision parameter and ambipolar diffusion). In 2nd, 3rd and 4th class, it started from the explanation of the etching and deposited thin film. I heard the explanation of the electrical discharge equilibrium model and the induced electrical discharge model and radical equilibrium in plasma. I made a presentation of poster at night. I could not only explain my research in English but also discuss with students. In addition, I could hear the research of the student who came from another University.

In 2nd day, I heard that the explanation of the electronic density, energy and flow rate in the low plasma at the first class. In the 2nd class, I heard that the explanation of variety calculation modes and the calculation of molecule and radical density in plasma. In 3rd class, I heard that the electronic density and the flow rate measurement in plasma generated by using the micro wave. In this lecture, I could see the plasma generated by micro wave actually. In 4th class, I heard that the explanation of the molecular energy level measured by using OES.

In 3rd day, I heard that explanation of usage and the character of thermal plasma, and the analysis results of it at 1st class. In 2nd class, I heard that the difference between of the method of generating ICP and CCP, and those characters. There was no class since afternoon, and I climbed a mountain with all students who participated in Summer school. I could take communications with foreigners while climbing a mountain and become a good experience for me.

In 4th day, I heard that the character of the corona discharge and conductor barrier discharge at 1st class. In 2nd class, I heard that the explanation of electron kinetics in atomic and molecular plasmas. In 3rd class, I heard the explanation of fluid modeling of DC charge plasmas in detail. In 4th class, I heard the explanation of the result of the measurement by using the laser absorption spectroscopy in plasma generated by using Xe gas. In 5th class, I heard the explanation about only the part where plasma was used in Hollywood movie. Because such a class form was the first experience for me, I could learn about the plasma happily.

In the 1st class of 5th day, I heard what kind of molecule formed in plasma and the formation mechanisms of it. In 2nd class, I heard the explanation of the research that paid attention to not the reaction in plasma but the surface reaction. The lecture on this day was a nearest content to my research.

In 6th day, the master class started in Summer school and it became difficult for me. In 1st class, it was a basic content concerning the nuclear fusion, and I heard the explanation of the nuclear fusion device and the generation mechanisms. In 2nd class, I learned about the result of measuring the reaction in fusion plasma and the character of it. In 3rd class, I heard about the scrape-off layer and divertor in the Tokamak, and the interaction of the surface.

In 1st class of 7th day, I heard the result of measuring the character in nuclear fusion plasma. In 2nd day, I heard the explanation of the measurement and the modeling of ELM in the fusion plasma. The lecture done in Master class was chiefly a content concerning the nuclear fusion. Therefore, I could hear the leading-edge information that was not able to hear usually, and I could spend significant time through I took time to understand.

In 2nd Japanese-German Student Workshop, I made a presentation at the Ruhr-University in Bochum. My topic of research is "Mass spectrometric investigation and growth

mechanisms of chemical species in the downstream region of Ar/CF₄/H₂ plasmas.” I measured neutral species and positive ions that exist in the Ar/CF₄/H₂ plasma by using mass analysis method in this research. Especially, I used Li⁺ attachment method for measurement of a neutral species. I became possible the measurement of neutral species in the state of fragment free, and came to be able to measure large chemical species of the mass number by using this method. In this report, I reported that chemical species which has a lot of unsaturated chemical bonds were newly observed by adding H₂ gas to CF₄ plasma and I reported that the result of plotting the amount of the hydrogen gas addition. There was no one near the content of my research though I heard other student’s research report. However, I could learn about film deposited and etching and the result of measured radical density which I don’t research usually.

In 2nd day, I visited the laboratory in Ruhr-University. There were various experimental setup according to each research purpose. The experimental setup that especially reminds in impression for me was discharge in atmosphere. The one that was not painful was mysterious though I touched plasma directly. There was a lot of another experimental setup that I can’t see in laboratory and in addition.

I could learn the leading-edge technology concerning plasma by making it participate in this European Summer School and 2nd Japanese-German Student Workshop. In addition, I could come across to the chance to touch English as the lecture and the oral presentation in English, and it have improved the desire of the study in my English. Moreover, I was able to do the experience that I was not able to be experienced in usual life by staying in the country where the culture was different. Finally, I wish to express my gratitude for the thing to give such a wonderful chance.