



**JSPS Program for Advancing Strategic International  
Networks to Accelerate the Circulation of Talented Researchers  
Global Networking on Molecular Technology Research**

**【Vol.1】 Report from Yijin ZHANG**

Max Planck Institute for Solid State Research is located in Stuttgart. Stuttgart is famous as a city holding the second biggest beer festival (“Volksfest”) in autumn. Needless to say, the biggest one in Germany is held in Munich and called “Oktoberfest”. Although it is even less recognised, the headquarters of Mercedes-Benz and Porsche are also in this city. Stuttgart is not a small city, but the lateral size is much smaller than cities in Japan. The institute is not in the central area of Stuttgart, rather, in one of the small towns / villages which surround the city centre. Even though, it takes less than 1 hour from either the central train station or the Stuttgart airport to the institute by public transportation (train or subway and bus). Nowadays Stuttgart becomes more and more famous because of a profession football team (VfB Stuttgart). The Japanese players, Hosogai and Asano, are now playing for this team.



Central area of Stuttgart

The atmosphere here in the institute is much different from that in Japanese universities. The most striking difference I felt is their attitude towards research. In Japan, many students and scientists are, to some extent, forced to work and/or study hard. For Japanese researchers, the life equals work; they live in order to do research, to get a good result, to publish lots of papers, and to succeed. In Germany, however, the work is only a part of the life. They work because it can enrich their life. I was so surprised when I found the institute is almost empty around 6 pm in weekdays and few people are there in the institute during weekend. Even though their working hours are much shorter than that of Japanese researchers, the efficiency of German researchers seems to be quite high. When they started to work, they really concentrate on their

own work. It is different from Japanese researchers, in particular students, who sometimes open twitter or facebook on their computer during reading papers or analysing data.

During this stay, I devoted most of my time on discussing about the new facility, with which I'm going to pursue my own project. As is mentioned above, my main focus is to reveal the fundamental physics of the circularly polarized electroluminescence from TMDs. This phenomena can be explained in short as following: when one make a light emitting diode (LED) using TMDs, a circularly polarized light coming out from the LED, and the polarization can be controlled by the direction of the bias current. So far, TMDs are only semiconductors which can be incorporated into such a functional LED devices. Although this functionality is unique and has wide potential for future applications, only a phenomenological explanation exists, at the present stage, which can only qualitatively explain the phenomenon. In order for the future applications, therefore, a complete understanding is inevitable, and a special facility is highly required for this purpose. Thanks to Prof. von Klitzing and Dr. Smet, we are going to construct such a facility in the max Planck Institute. We had discussed the arrangement of the lab room (which was under renovation) as well as the scrutinized the requirement of each instruments. In the meantime, I also checked their facilities for the fabrication of LEDs using TMDs, and had confirmed a similar device operation.

The next visit is scheduled after the lab renovation. Hopefully, we can built-up the facility and do some simple tests during the next stay.



With Prof. von Klitzing.