

# International Internship at the ETH Zurich University

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Period: 1<sup>st</sup> August, 2019 – 31<sup>st</sup> October, 2019 (3 months)

Country: Switzerland

Supervisor: Professor Roland Riek

Institute: Laboratory of Physical Chemistry, Department of Chemistry and Applied Biosciences, University of ETH Zurich

## Research:

It all started when I met Dzmitry Ashkinadze, a doctoral student from Professor Roland Riek's laboratory, who worked with us on his project "Biochemical and structural studies of proteins using fluorescent nanodiamond technology" at Shirakawa laboratory. The meaningful time I spent with him drove me to an international internship regarding the application of fluorescent nanodiamonds as biological nanosensors to observe cellular events at Riek laboratory. Professor Roland Riek's research aims to understand the mechanism of the conformational structure change of proteins which are associated with neurodegenerative diseases, protein-protein interactions and enzymes. He and his group members are all excellent biologists. Although my main research area is about improving the material properties of the fluorescent nanodiamonds as bio-imaging probes through chemistry and physics, including to reduce nano-probe size, stabilize color centers in nanodiamonds and realize specific targeting, I was able to deepen my understanding in biologist's needs and desires for my research. During my international internship, thanks to the knowledge, instruments and expertise of the Professor Riek's group, we were able to try to demonstrate 5 nm-fluorescent nanodiamonds as nano-probe using Stochastic Optical Reconstruction Microscopy (STORM) in cells. STORM imaging is one of the latest nano-metric super-resolution imaging that detects dynamic biomolecules in cells at a few nanometers resolution. The results gave me many clues for future experiments, which I will continue at Shirakawa lab.



Picture with Prof. Riek  
laboratory members



ETH University

### Research environment:

Research environment was so different from that at Japanese universities. I think that a useful and effective system exists at where we can get desirable reagents through direct contact with people in charge. In ETH, this is all managed on the ETH website in an extremely efficient manner. Moreover, the ETH university supported my research work with remarkable IT services, including numerous software licenses and cloud services for free. Even more surprisingly, there are cleaning service for experimental glass apparatus and an on-campus store where chemical specialists can order commonly used reagents and items. I am amazed by these wonderful services and generous supports, which give us a fruitful and meaningful research experience at ETH.



My room

### My life:

My apartment is located outside Zurich city and it took me 50 minutes from home to school by bus. The location of my apartment was at wonderful spot surrounded by lots of trees and fresh air. Although I heard from my friends that the life abroad could make us frustrated, I found myself enjoying a lot with the excellent environment. Public transports such as train and bus were always as scheduled, supermarkets were very close to my apartment and I found a lot of shops and items that cannot be seen in Japan, which was a thrilling experience for me.

The city centre of Zurich was within 20 min by bus, with a breath-taking Lake Zurich, beach and parks. During the holidays, a lot of people enjoy their day offs, walking along the lake, lying down on the beach and have great time with their children. Zurich is both a very comfortable place to live in and a scenic-oriented place that I encourage everyone to visit.

### Acknowledgement:

Here, I would like to express my sincere thanks to professor Roland Riek and doctor Takuya Segawa for taking care of me as an exchange student, and we had a lot of productive work and discussions done. I also would like to thank the members in professor Roland Riek laboratory for their kindest support and guidance. Finally, I would also like to thank Japan Gateway Program (JGP) for the financial support which made everything possible.



Picture with Dr. Segawa  
Takuya and his family



Lake Zurich