# STEPS Students Report

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I have stayed Tunik laboratory of Saint Petersburg State University. The department is located at Petergof, and the distance from downtown is about 50 km. In Tunik lab, the research about photophysical property is greatly improved. Lab members are consisted of doctor, master or second year of bachelor students, who are all very kind. For example, they have the culture called pancake week on the second week of February and they invited me to the party of eating pancake together. Furthermore, they have teatime every evening. Teatime means the rest time, and four or five lab members gather at one table and drink tea together. I thought it is very good habit. This is because teatime gives us communication time. Perhaps, by the time, I seemed that I got along well with the lab members.

For the duration of stay, my research theme was synthesizing three co-complexes and evaluating them about photophysical property. Co-complex has two different rare-earth metals. I selected europium, neodymium, dysprosium and terbium, because europium has photo luminescence property, which is studied extensively at Tunik lab and other metals have magnetic property, which is greatly researched at Ohkoshi lab where I belong to at The University of Tokyo. Therefore, I tried synthesizing co-complexes of europium and other metals. First, three types of tris(thenoyltrifluoracetonate)(2,2'-bipyridine)europium(Ⅲ), $Eu(TTA)_3bipy$ complexes were synthesized depending on different pH value, ranging between 7.5 and 6.0 by solution technique. This is because $Eu(TTA)_3bipy$ complex is reported as changing photo luminescence intensity at different pH value. Three types of complexes were named as pH6-$Eu(TTA)_3bipy$, pH7-$Eu(TTA)_3bipy$ and pH7.5-$Eu(TTA)_3bipy$. By NMR, X-ray diffraction, infrared spectra and ESI-MS, I confirmed the existence of $Eu(TTA)_3bipy$. These complexes show red emission peak on photo luminescence measurement. Second, I synthesized $Nd(TTA)_3bipy$, $Dy(TTA)_3bipy$ and $Tb(TTA)_3bipy$ by same method as synthesis of $Eu(TTA)_3bipy$. Finally, I prepared three co-complexes ($Nd_{0.5}Eu_{0.5}(TTA)_3bipy$, $Dy_{0.5}Eu_{0.5}(TTA)_3bipy$ and $Tb_{0.5}Eu_{0.5}(TTA)_3bipy$) by grinding two complexes each. Then, I selected one of pH7.5 in three $Eu(TTA)_3bipy$ complexes because the amount was most numerous. Then I evaluated photophysical property of these co-complexes. The data was measured in $CH_2Cl_2$ solvent at r.t., $\lambda_{exit}$ = 385 nm. These co-complexes show almost same peak intensity because they have europium. Europium emits red light, and red light has wavelength region at about 600 nm. Therefore, my achievements were synthesis of co-complex having luminescence behavior. Furthermore, I brought samples to Ohkoshi lab to evaluate magnetic property.

Thus, my connection with Tunik lab will continue from now on.

In addition, I have been to the downtown of St. Petersburg with Tunik lab members on holiday. We enjoyed some museums and Russian foods. Through this program, I learned not only Russian culture but also the existence of people who make an effort to research as well as us in different country. I had a nice time!!