

TITLE OF REPORT : Exploring Research Collaboration and Student Exchanges

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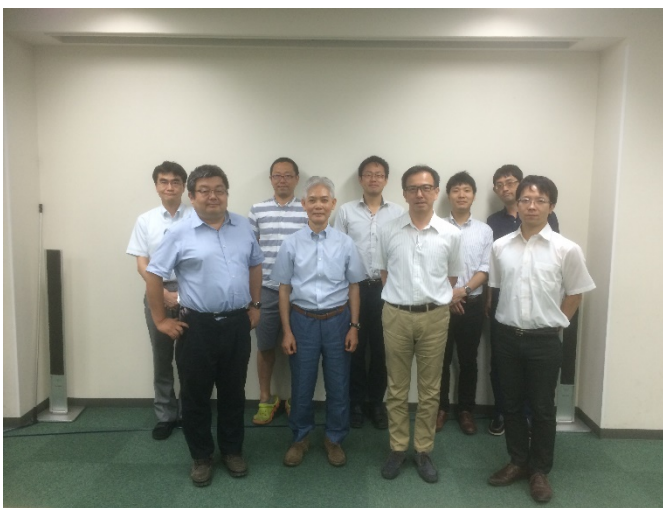
Background

My research program at Kansas State University focuses on (i) catalytic asymmetric oxidation using chiral bimetallic nanoclusters stabilized by chiral polymers; (ii) discovery and bio-evaluation of anti-Alzheimer molecules; and (iii) development of electronic biosensors for the detection of triple-negative breast cancer (TNBC). Professor Kiyosei Takasu at the Department of Pharmaceutical Science, Kyoto University is interested in the synthesis and discovery of new drugs for various diseases including Alzheimer's disease and anti-fungal agents. Because of our common interests in drug discovery and bio-evaluation, a collaborative discussion project was applied to Japan Society for Promotion of Science (JSPS) for a Bridge Fellowship, which was funded for my stay in Professor Takasu's group from July 17 to August 30, 2018. The awarded activities include presentation of seminars and discussion with faculty and students in various universities (see discussion below) for possible future collaboration and exchange of students. My current collaborators include Professor Lee-Way Jin at the University of California, Davis and Dr. Simon Xie at AfaSci Research Laboratory, Redwood City, CA on the Alzheimer project, Professor Jun Li at Kansas State University (KSU) on the development of biosensor for TNBC, and Dr. Govindsamy VEDIYAPPAN at the Biology Division, Kansas State University on bio-evaluation of drimenol and its analogs for antifungal activity. The possible collaboration with Professor Takasu may lead to future biological evaluation of synthesized molecules from Dr. Takasu's laboratory. The discovered method for selective C-H oxidation of alkanes and natural products from my research group using chiral bimetallic nanoclusters stabilized by chiral polymers may be used to transform various synthetic bioactive molecules generated from research groups such as those from Professor Takasu. The successful transformation will generate a library of molecules for biological evaluation and possible improvement of biological activity and pharmacological properties. Hence, discussions with various pharmaceutical science research groups in Japan may stimulate future collaboration and exchange of students. It is anticipated that the collaboration will allow students in Professor Takasu's groups to carry out research projects in my laboratory and *vice versa*. Such collaboration and exchange program can be extended to other research groups, such as those in Professors Keiji Maruoka (Kyoto University), Tomoyuki Yoshimura (Kanazawa University), Takumi Furuta (Kyoto Pharmaceutical University), and Ken-ichi Yamada (Tokushima University).

Activities

Research exchange and networking opportunity

I was provided the opportunity to visit laboratories of the aforementioned universities and present results from my research group on the aforementioned catalytic asymmetric oxidation reactions and anti-Alzheimer drug discovery. The visitations and presentations expand future networking opportunity, since the seminar presentations were listed in the universities' website and numerous students and faculty have attended my seminar presentations. Interests from the audiences were raised and possible collaboration was discussed. I presented seminars at the Department of Chemistry, Kyoto University on July 23, Department of Pharmaceutical Science, Kyoto University on July 24, Department of Pharmaceutical Science, Kanazawa University on July 27, Kyoto Pharmaceutical University on August 6, and Department of Pharmaceutical Science, Tokushima University on August 24. The photo showed Professor Takasu (first row, left), faculty at the Department of Pharmaceutical Science, Kyoto University, and myself, taken from my visit. I had the opportunity to discuss chemistry and biology with various professors, postdoctoral fellows, and graduate and undergraduate students at the aforementioned universities.



Participation in research discussion with graduate students

I attended research presentations from various graduate students in Professor Takasu's research group. The graduate students' presentations were most helpful since research problems and possible solutions were carried out. The discussions may advance their research and encourage future collaboration. I have also found that the graduate students presented their work and research problems well and the exchange of ideas is productive. Similarly, I had the opportunity to discuss with other students at Kanazawa University, Kyoto Pharmaceutical University, and Tokushima University.

Research collaborations and student exchanges

During our research discussion, Professor Takasu mentioned that our catalytic asymmetric oxidation methods can be used to oxidize his synthetic intermediates and bioactive natural

products. Moreover, several structurally unique molecules can be bioevaluated in my collaborators' laboratories at the United States. I am hopeful that a fruitful collaborative research project will be resulted. Similar efforts were pursuit at Kanazawa University and Tokushima University.

Potential for future collaboration

The developed asymmetric oxidation methods from my laboratory likely can be used in the conversion of available molecules obtained from the above research groups into numerous oxo or amino derivatives. These derivatives may have improved pharmacological properties such as enhancement of bioavailability and inhibition of targeted proteins. Such possibilities were carried out during the discussions with Professors Maruoka, Yoshimura, Furuta, and Yamada. Positive responses were received and potential future collaboration is being discussed.

Daily life in Japan

Although the temperature in July and August was high, I had a wonderful stay in Kyoto and Tokushima. I stayed in an apartment (weekly mansion) at the center of Kyoto and the public transportation including bus, subway, and train, was convenient and abundance. Needless to say, people in Japan is extremely kind and friendly and the sea foods are excellent. Beside my stays in Kyoto and Tokushima, I also visited Kanazawa. The scenery was great.

Conclusion

The experience in Japan is marvelous and I would recommend our students and faculty for the application to various awards available from the Japan Society for Promotion of Sciences (JSPS). The funding provided sufficient fund for the stay in Japan including big cities such as Kyoto. Importantly, the funding provides the opportunity to collaborate with various research groups in Japan and networking. Research discussions were helpful and research presentations have raised interests from the professors and students alike. The contacts with postdoctoral fellows and graduate students also bring future exchange programs for researchers to experience new research projects from Japan and United States. I gratefully acknowledge the funding from JSPS.