



國立交通大學  
*National Chiao Tung University*

出國報告（出國類別：學術交流與訪問）

## 出訪早稻田大學

服務機關：應化系

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前往國家：日本 東京

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## 一、摘要 (200-300 字)

I visited to Waseda University on November 10th and 11st to discuss with Dr. Masahiro Ando about a Raman micro spectroscopy and data analysis, to attend the pre-symposium of 35th Symposium on Solution Chemistry, and to make a presentation on temperature measurements from low frequency AntiStokes/Stokes Raman scattering.

The discussion with Dr. Ando was informative for me. I learned a lot for developing a high-sensitive microscope for low frequency Raman measurement. It will be helpful to improve our apparatus.

The pre-symposium was a cross-sectoral symposium. All presentations in the symposium were not in the solution chemistry research field, and different from each other. They were new and enjoyable for me.

Many audiences were interested in my presentation. After my presentation, I have many questions and suggestions. Some of them gave me ideas of new research subjects, which I could not think about without discussing in this symposium. I feel really fortunate to participate in the symposium, and to talk with the researchers in many different research fields.

我在 11 月 10 號及 11 號出訪早稻田大學，目的是為了和 Masahiro Ando 博士討論拉曼顯微光譜學及資料分析，參加第 35 屆溶液化學研討會，並且做一個關於低振波(AntiStokes/Stoke)拉曼散射溫度測量的發表。

和 Ando 博士的討論對我相當有幫助，我得知許多關於如何開發低振波拉曼測量之高感度顯微鏡的資訊。這對於我們改進我們的裝置相當有幫助。

溶液化學研討會是一場跨領域的研討會，在場的發表主題都不相同，且都不屬於溶液化學的研究領域，這一點讓我覺得很創新且有趣。

有不少參加者對我的發表表示興趣。在我的發表結束後，得到了不少發問以及建議。其中的一些意見給了我新研究計畫的靈感，有一些是我想如果我沒有在此研討會內進行討論就不會想到的。我覺得很慶幸能夠參與這次研討會並且和來自各領域的研究學者們進行交流。

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### 三、本文

#### (一) 目的

The purposes of this trip are as follows.

- (1) To visit Dr. Masahiro Ando in Waseda University, and discuss our collaborated research on Raman micro spectroscopy and multivariate analysis
- (2) To attend the pre-symposium of 35th Symposium on Solution Chemistry held in Waseda University
- (3) To make an invited presentation of our recent results on molecular-selective temperature measurement from low-frequency AntiStokes/Stokes Raman scattering at the pre-symposium

這次出訪的目的如下:

- (1) 去拜訪在早稻田大學的 Masahiro Ando 博士, 和他討論拉曼顯微光譜和多變數分析的共同研究
- (2) 參加於早稻田大學舉行的第 35 屆溶液化學研討會
- (3) 於會議中發表低振波 AntiStokes/Stokes 拉曼散射的分子選擇性溫度測量相關的最近研究成果

#### (二) 過程

The following is the time schedule of this trip.

以下是我這次的行程

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Friday 9th Nov.

11/9 搭機前往日本

Saturday 10th Nov.

Waseda University (Consolidated Research Institute for Advanced Science and Medical Care) to visit Dr. Ando

11/10 於早稻田大學拜訪 Ando 博士

Sunday 11st Nov.

Waseda University (Nishiwaseda Campus) to attend and to present at the symposium

11/11 參加於早稻田舉辦的會議

Monday 12nd Nov.

11/12 搭機返台

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(Saturday 10th Nov.)

I visited to Dr. Masahiro Ando, and discussed Raman micro spectroscopy and multivariate data analysis with him. After the discussion, I looked around their laboratory and their Raman micro spectrometers. The laboratory floor kept clean, and the apparatuses are well designed for collecting Raman signal efficiently. I learned a lot how to construct such a high-sensitive Raman microscope. This visit and discussion was informative for me. I am now going to extend our low frequency Raman spectroscopy to microscopic measurement for studying micro scale samples such as micro crystals or biological cells. According to their advice, I will be able to construct much better apparatus.

11 月 10 日,星期六

我拜訪了 Masahiro Ando 博士，並和他討論拉曼顯微光譜學及多變數分析。討論結束後我參觀了他們的實驗室以及拉曼顯微光譜儀。他們的實驗樓層相當整潔乾淨，裝置設備也都組織良好，可以有效率地擷取拉曼訊號。對於如何組織高感度的拉曼顯微鏡，我學到了很多。這次出訪及其中的討論讓我得到了相當多的資訊。我打算擴展我們的低振波拉曼光譜系統，以使用顯微鏡測量去研究像是顯微水晶或是生物細胞等的顯微散射樣本。有了他們實驗室的建議，我可以製作出更好的裝置。

(Sunday 11st Nov.)

I attended the pre-symposium of 35th Symposium on Solution Chemistry, which was organized by the Japan Association of Solution Chemistry. The aim of this symposium was to invite young researchers who are not familiar with solution chemistry, and to discuss their research among solution chemistry researchers. Prof. Yukihiro Yoshimura in National Defense Academy of Japan was interested in our research on ionic liquids, and kindly invited me to the symposium.

The topics of all presentations are quite different from each other, high-pressure, ionic liquids, synchrotron radiation, Raman spectroscopy, glass phase, microbial genetics, etc. Each speaker had 40 minutes for his talk, and started from very basic of his research. Such a basic talk is not presented in usual academic symposiums. Although all topics were not familiar to me, they were really clear and interesting.

One of the talks that interested me most was the talk given by prof. Fumiyoshi Abe in Aoyama University. He reported membrane fluidity of microscopic organisms living under different hydraulic pressure. The membrane fluidities of different organisms differ under the ambient pressure, but they are almost same under the

pressure where the organisms are usually living. His talk was related to the environment adaptability of life under high pressure from the viewpoint of molecular science. Such study was new for me, and maybe for the audiences.

I made a presentation of our recent research on temperature measurements from low frequency AntiStokes/Stokes Raman scattering. I reported new temperature tracing of anthracene, ionic liquids, and water, and I emphasized that our measurement enables to investigate transient and/or molecular-selective temperatures. Most of all audiences seemed interested in my talk. I had a lot of questions after my presentation. One of the audiences, Dr. Akihiro Wakisaka asked me to study azeotropy of binary mixture with our method. Molecular-selective temperature measurement of boiling binary mixture may give information of the solution environment. I would not think about it without talking with him. It was very informative to discuss with the researchers in solution chemistry field.

After the symposium, I talked with Prof. Abe about the possibility of temperature imaging of living cells, which may be a new topic of my research.

11 月 11 日，星期日

這天我去參加由日本溶液化學協會舉辦的第 35 屆溶液化學研討會。此次研討會的主要目的是邀請對於溶液化學並不那麼熟悉的年輕學者們參與該領域的學者討論溶液化學。Yukihiro Yoshimura 教授對於我們的離子液體研究有興趣，所以邀請我參加此次的研討會。

會議中的發表題目都互相有相當大的差異，有高壓、離子液體、同步輻射、拉曼光譜學、玻璃相、微生物遺傳學等等。每個講者都有 40 分鐘的發表時間，以便他從他研究的基礎開始講起。像這樣從基礎開始講起的發表在一般學術性的研討會中並不常見，而雖然很多都是我不熟悉的領域，不過講解都很清晰也很有趣。

其中最讓我感興趣的是青山大學的 Fumiyoshi Abe 教授所帶來的發表。他報告了在高水壓下存活的顯微有機體的膜流動性。不同顯微生物的膜流動性會因周遭的壓力而改變，但是當那些有機體處於它們通常生存的壓力下時，膜流動性幾乎都是一樣的。他的發表是以分子科學視點去觀察高壓下生命的環境適應性。這樣的研究對我來說是新的領域，對觀眾來說或許也是。

我做了一個關於低振波 AntiStokes/Stokes 拉曼散射的溫度測量的近期研究成果的發表。我報告了關於蔥(一種碳氫化合物，俗稱綠油腦)、離子液體和水的一個

新的溫度追蹤方式。我強調我們的測量方式能夠偵測瞬間的及/或是分子選擇性的溫度。很多觀眾對我的發表有興趣，在我發表結束後有很多人提問。其中一位參加者 Akihiro 博士建議我可以用我們的方法研究二元混合物的共沸性 (azeotropy)。沸騰二元混合物的分子選擇性溫度測量或許可以對溶液化學界帶來一些新的資訊。如果沒有和他談話的話我不會想到這一點。這次能和溶液化學界的研究學者進行討論著實讓我獲益良多。

在研討會結束後，我和 Abe 教授討論活體細胞溫度成像的可能性，這可能會成為我的新研究主題。

### (三) 心得及建議

The visit at Waseda University was fruitful for me. I enjoyed making a presentation for researchers who are not familiar with our research field, and discussing with them. The discussion gave me a lot of inspirations about our new research subjects, and made me understand what is the most important, interesting and original of our research from the general scientific point of view. Such kind of constructive interaction of different researchers is one of the aims of this cross-sectoral symposium, I think. I feel fortunate to participate in this symposium.

這次出訪早稻田大學我受益良多。對不熟悉我們研究領域的學者們進行發表並和他們進行討論是個相當有趣的經驗。這次所進行的討論給了我很多關於新研究的靈感，也讓我了解從一般科學角度來看我們的研究時，最重要、有趣及最有原創性的部分在哪裡。我認為讓來自不同領域學者們進行有建設性的交流便是此類跨領域的研討會最主要目的。我很慶幸能夠參與此次研討會。