Work and life in Japan of a JSPS Fellow

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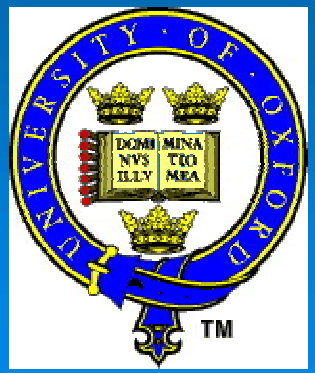


Essential question you may ask:

- who?
- how?
- when?
- where?
- why?

Who?

- guest: myself, soft condensed matter physicist and neutron scatterer
- host: Professor Kanji Kajiwara, Faculty of Engineering and Design, Kyoto Institute of Technology, Kyoto
- nearest neighbour: Professor Keisuke Kaji, Institute for Chemical Research, Kyoto University, Uji

How?

- through a Fellowship scheme of the JSPS awarded in 1996
- it provided a generous support of collaboration with Japanese colleagues
- started in 1985 with my Royal Society Fellowship held in the group of Professor Ryozo Kitamaru, Institute for Chemical Research, Kyoto University, Uji
- in between: reciprocal visits

When?

- 04-03-1996 to 31-05-1996
- at the peak of my responsibilities as a Lecturer in Physics: I was leading five PhD students, several final year projects in addition to lecturing and administrative duties
- at the point of breaking into a new field – for me – of modelling complex materials

Where?

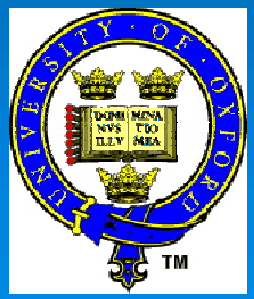
http://www.uji.kyoto-u.ac.jp/english/index.html

http://www.kit.ac.jp/english/02/02_010100.html

Why?

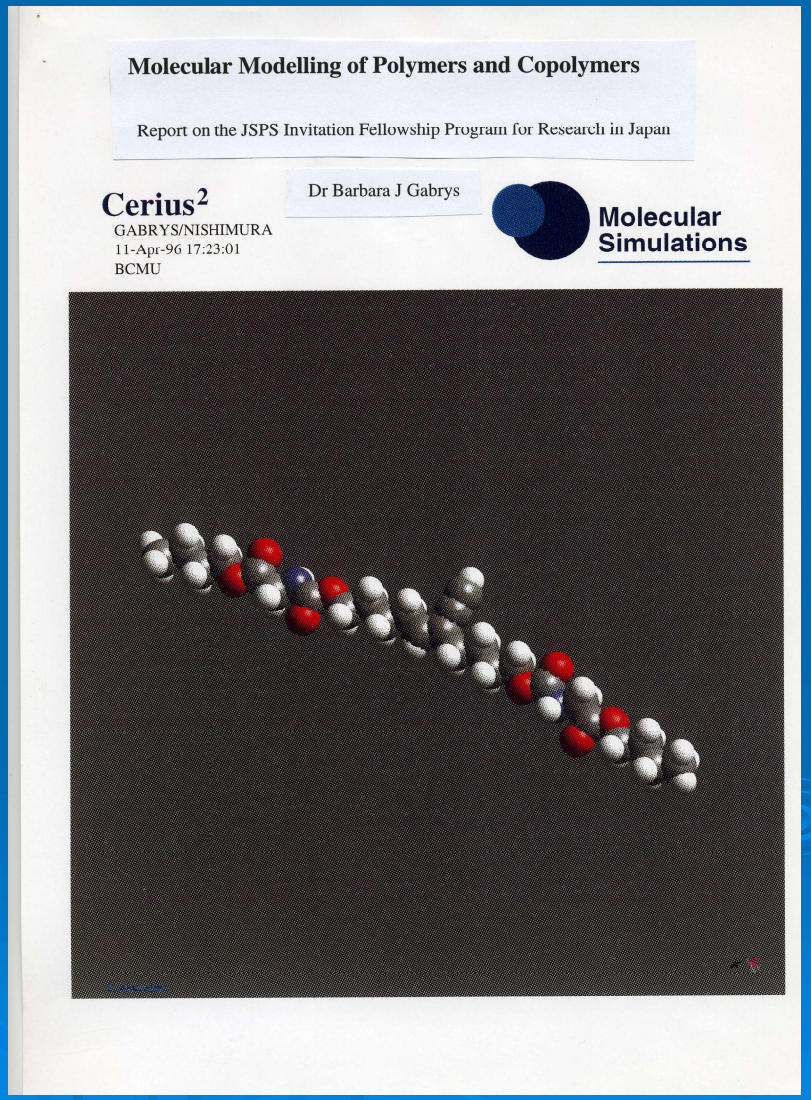
Molecular Modelling of Polymers and Copolymers

- to model the scattering law from polymers
- to gain a deeper insight into the structure-property relationship of ionomer blends
- molecular modelling using Cerius^2 software
- identify areas of common interest for ongoing collaboration



Work

With Dr Yasuo Nishimura, Osaka National Research Institute



Daily life

Main outcome of the Fellowship

ELSEVIER

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Electrostatic persistence length of NaPSS polyelectrolytes determined by a zero average contrast SANS technique

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(Revised 7 March 1997)

The electrostatic persistence lengths b_e of NaPSS polyions have been measured as a function of ionic strength I in the solutions using a small-angle neuron scattering (SANS) technique combined with a zero average contrast (ZAC) method. This ZAC method provides the optical *theta* condition distinguishing the intermolecular scattering functions $S_2(q)$, and thereby the scattering functions of a single chain $S_1(q)$ free from the intermolecular interferences were obtained. The resulting b_e values which were derived by the analysis of $S_1(q)$ are proportional to $I^{-1/2}$. This work confirms and extends an earlier SANS study where the contrast-match was used. © 1997 Elsevier Science Ltd.

(Keywords: polyelectrolytes; electrostatic persistence length; zero average contrast SANS)

Results

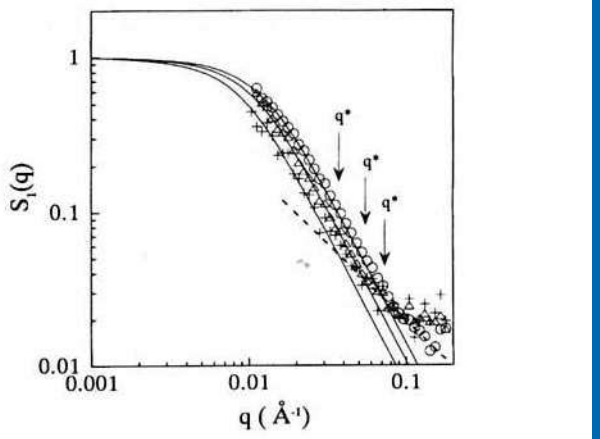


Figure 1 Logarithmic plot of intramolecular scattering function $S_1(q)$ as a function of the scattering vector q. q^* denotes the transition point (see text). (○): $C = 1.445$ mol/l; (△): $C = 0.723$ mol/l; (+): $C = 0.241$ mol/l. Solid lines: Debye functions for Gaussian coil; the values of parameter b_1 are listed in *Table 1*. Dashed line: des Cloizeaux function for $N = 640$ in the rod limit

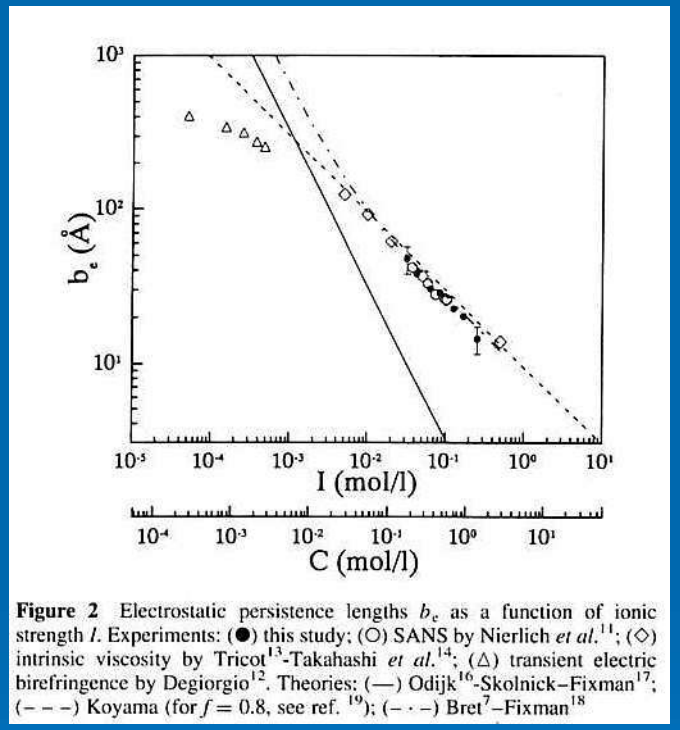
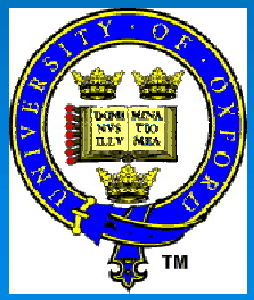


Figure 2 Electrostatic persistence lengths b_e as a function of ionic strength I. Experiments: (●) this study; (○) SANS by Nierlich *et al.*[11]; (◇) intrinsic viscosity by Tricot[13]-Takahashi *et al.*[14]; (△) transient electric birefringence by Degiorgio[12]. Theories: (—) Odijk[16]-Skolnick–Fixman[17]; (– – –) Koyama (for $f = 0.8$, see ref. [19]); (– · –) Bret[7]–Fixman[18]



- good agreement of experiment and theory (Koyama, Le Bret-Fixman) for ionic strength $I > 10^{-2}$ mol/l; universal relationship be ~ $I^{-0.5}$ valid
- more experiments and theory needed to explain behaviour for $I > 10^{-2}$ mol/l

There are at least 101 reasons to go to Japan...

... work is only one!

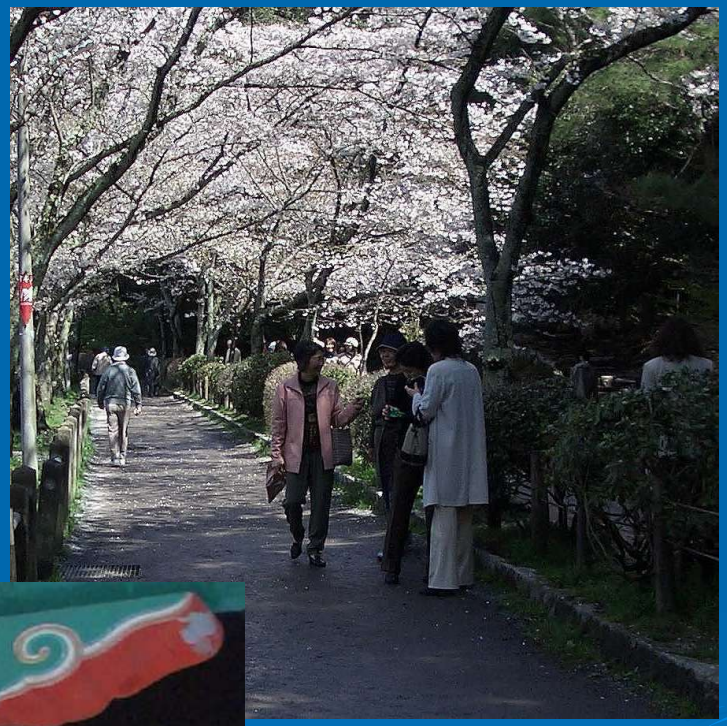
Play and socialising...

outings ‘85

nature...

view from Shugakuin Villa

culture and customs...



special events...

retirement of Professor Kaji, Kyoto University, June 2002

food and drink...

Professor Toshiji Kanaya entertaining (April 04)

(from Fotosearch)

...and lots of other things yet to be discovered!

I would like to thank JSPS for giving me a unique opportunity to live and work in Japan fro several weeks.