

徐彤(ジョ・ドン)さん / 奈良女子大学
Dr. Tong Xu / Nara Women's University

<外国人研究者プロフィール Profile>

国籍: Nationality:	中国 / China
日本留学時の滞在期間: Period of Stay During in Japan:	2000年10月13日 ~ 2004年3月24日 Oct 13, 2000 ~ Mar 24, 2004
日本留学時の大学: Education Background in Japan:	奈良女子大学博士課程 Nara Women's University
専攻分野: Major Field:	高分子科学 / Polymer Material Science
現在の所属/職位: Present Institution / Status:	中国 西安交通大学 准教授 Xi'an Jiaotong University, China. Associate Professor



徐彤(ジョ・ドン)さん
Dr. Tong Xu

<研究報告 Follow up Research Fellowship>

受入研究者氏名: Research Adviser:	黒子 弘道教授 / Prof. Hiromichi Kurosu
受入れ期間: Researching Period:	2010年9月1日 ~ 2010年11月29日(90日間) Sep 1, 2010 ~ Nov 29, 2010 (90days)
研究課題: Theme of Research:	高分子材料学 The ¹³ C CP/MAS solid-state NMR study of density fluctuations in amorphous poly(ethylene terephthalate) films in terms of quasispinodal decomposition

■研究概要 Outline of Reserch

It has been considered that primary crystal nucleation occurs as spontaneous fluctuations form embryos of sufficient size in a super cooled liquid. But extensive studies have found spinodal decomposition (SD) from the unstable state, which is due to orientation fluctuations of stiff polymer segments before the emergence of a crystalline structure. In my previous paper, crystallization of amorphous PET films was studied in terms of orientation fluctuation of SD by SALS and positron annihilation lifetime spectroscopy. The objective of this work is clarifying the fine structures in PET film during spinodal-assisted crystallization by ¹³C CP/MAS solid-state NMR spectroscopy. The parameters from NMR measurement will be related to the data obtained by SAXS, SALS and positron annihilation.



黒子教授の研究室にて(1)
In Professor Kurosu lab (1)

■研究成果 Result of Reseach

¹³C CP/MAS NMR spectra were recorded for PET films annealed above spinodal decomposition temperature for different time. The rotating-frame relaxation parameters $T_{\rho}(1H)$ s were also studied for several annealed PET films.

With regard to the non-annealed film, the ¹³C CP/MAS spectra of annealed PET films become narrow and the chemical shift values of ethylene and carbonyl carbons move to high field as the annealing time increase. It is reasonable that the narrow high-field peak is assigned to the relatively ordered NMR crystalline region. The chemical shift values of aromatic carbons move to low filed first and then gradually move to high field again. Surprisingly, the benzene carbons of the PET films annealed for the times corresponding to the period of SD have an abrupt increase in chemical shift values.



黒子教授の研究室にて(2)
In Professor Kurosu lab (2)

The $T1\rho$ (1H) relaxation decay of ethylene, aromatic, or carbonyl of the annealed PET films could be fitted well with one or two exponential. $T1\rho$ (1H) relaxation times of the PET samples annealed for the times corresponding to the period of SD are more longer than those of samples annealed for the time before SD and almost the same as those of samples annealed for the time after SD. When the samples annealed for the time after SD, the $T1\rho$ (1H) relaxation decay of ethylene, aromatic, or carbonyl show almost identical decay.

■ 日本留学の思い出 Memories of Studying in Japan

Everything went smoothly after I came here. This is so soothing since before the arrival it was all uncertainty and apprehension about the visit in my mind, which arose from the short time allowed for the study and the thought that I would have to go with my 5-year-old daughter.

As mentioned above, there was the worry about the experiment: Will I be able to realize my plan of the complicated NMR testing within three months? Fortunately, it was largely finished with even preliminary analysis of the results with the help of Prof. Kurosu, Adachi san, and Nakamura san.

My daughter was apparently very well cared for by her Japanese teachers in the kindergarten between 8 am and 6 pm everyday because she was always pleased to leave home but reluctant to come back.

We were able to live a convenient and warm life here due to the thoughtfulness of teacher Kita and teacher Chikada of International Exchange Section, too. Our indebtedness also goes to my Japanese friends Komori san and Sawako san.

I will never forget the favor I got from all who have helped. Thank you very much for the support from JASSO which make me continue the study on this subject.