

A Compton scattering study of DNA liquid-crystalline gel

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Introduction

DNA liquid-crystalline gel (LCG) is of current interest for its useful property such that carcinogenic agents and environmental hormones having planar aromatic groups intercalate into DNA double helices.

In this study we have prepared LCG of sodium-type double-helical DNA from salmon milt by dialysis of the concentrated DNA solution into concentrated AlCl_3 solution [1]. The process yields self-organized DNALCG.

Experimental

In order to get information about the mechanism of self-organization we have measured Compton profiles of the DNALCG along and perpendicular to the aligning axis using the high-resolution Compton scattering spectrometer at the KEK-PF-AR. The DNALCG sample was sealed into a cube shape container made of PET film of $1\mu\text{m}$ thickness, then placed in the scattering chamber which is filled with He gas of 1 atmospheric pressure. The measurements were carried out at room temperature.

Results

Figures 1 shows that the observed profile is not reproduced by the sum of the theoretical atomic profiles of the constituent elements [2], and Figures 2 shows that the observed profiles have a very small anisotropy, which can be caused by one dimensional electronic structure.

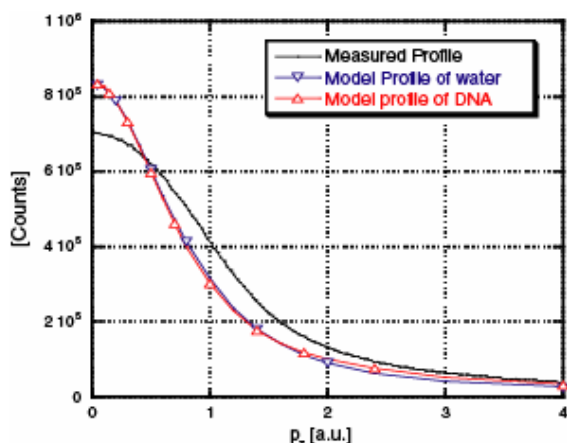


Fig.1 Comparison with an atomic model profile.

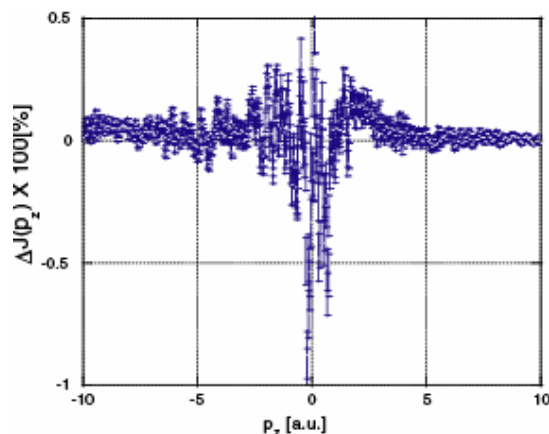


Fig.2 Anisotropy between measured Compton profiles of the DNALCG along and perpendicular to the aligning axis.

References

- [1] T. Dobashi, K. Furusawa, E. Kita, Y. Minamizawa and T. Yamamoto, *Langmuir*, vol. 23(2007)p.1303
- [2] F. Biggs, L. B. Mendelsohn and J. B. Mann : *ATOMIC DATA AND NUCLEAR DATA TABLES*. 16 (1975), 201

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