

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Temperature Coefficients of Unperturbed Chain Dimensions for Flexible Polymers¹ MASASHI OSA, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, HIDETSUGU KANDA, TAKENAO YOSHIKAWA, HIROMI YAMAKAWA, Department of Polymer Chemistry, Kyoto University, Japan — Until now, we have made a series of experimental studies of dilute solution behavior of typical flexible polymers on the basis of the helical wormlike (HW) chain model. From an analysis of experimental data obtained for the polymers including their oligomers in their respective Θ states, we have shown that atactic poly(α -methylstyrene) (a-P α MS) with the fraction of racemic diads $f_r=0.72$ tends to retain large and clearly distinguishable helical portions in dilute solution while atactic polystyrene (a-PS) with $f_r=0.59$ does not. In this study, we determined the temperature coefficient $d \ln \langle R^2 \rangle_0 / d T$ of the unperturbed mean-square end-to-end distance $\langle R^2 \rangle_0$ with T the absolute temperature from light scattering measurements for a-PS and a-P α MS. It has then been found that $d \ln \langle R^2 \rangle_0 / d T$ is definitely negative for a-PS but almost vanishes for a-P α MS. The results are consistent with the HW theory prediction.

¹This research was partly conducted at the Center for Nanophase Materials Sciences, which is sponsored at Oak Ridge National Laboratory by the Division of Scientific User Facilities, U.S. Department of Energy.

Masashi Osa
Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

Date submitted: 22 Nov 2006

Electronic form version 1.4