

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Inter- and intra-chain Proximity in PS and PMMA free-standing thin films Studied by Fluorescence NRET JIE XU, GI XUE, Nanjing University — The reduction in glass transition temperature (T_g) for free-standing thin polymer film has attracted a long term discussion. We found that the inter- and intra-chain coupling/constraint restricts the molecular motion of polymer chains and thus results in the deviation in glass transition dynamics. To observe inter-chain proximity and control the inter-chain interaction, we attached carbazolyl probe (donor) and anthryl probe (accepter) to some side groups of different chains respectively. Meanwhile, we also attached both donor and acceptor to one chain to characterize the intra-chain constraint. A close proximity of the donor to the acceptor results in a higher NRET efficiency. So the NRET results can provide information about chain proximity and packing density in polymer thin film. With decreasing film thickness h , the density of the films was reduced. The magnitude of the reduction in packing density for PS free-standing films was much larger than that in PMMA, resulted a larger reduction in T_g for PS film.

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Date submitted: 15 Nov 2011

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