Abstract Submitted for the MAR07 Meeting of The American Physical Society

Free Volume behavior and Structure of Polymer Thin Film SEISUKE ATA, TOSHIAKI OUGIZAWA, Tokyo Institute of Technology, MAKOTO MURAMATSU, TOSHIYUKI OHDAIRA, RYOICHI SUZUKI, TOSHITAKA OKA, KENJI ITO, YOSHINORI KOBAYASHI, National Institue of Advanced Industrial Science and Technology — Free volume hole size (Fv) of polystyrene thin films were measured by positron annihilation lifetime spectroscopy (PALS) by using slow positron beam. Though glass transition temperature was decreased in very thin film(less than 2Rg), decrease of Fv was observed concurrently. But these were inconsistent from the general recognition of relationship between Fv and glass transition temperature. In addition, increase of thermal expansion coefficient of Fv and decrease of generation temperature of positronium bubble which indicated decline of cohesive force of polymer chains, were observed. From these results, it was inferred that the physical properties change by thinning of polymer film was induced by change of polymer structure due to the reduce of polymer chain entanglement.

Toshiaki Ougizawa Tokyo Institute of Technology

Date submitted: 20 Nov 2006 Electronic form version 1.4