Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

The Effects of Surface Interactions and Confinement on the Melting Point of Semi-crystalline Polymer Thin Films YANTIAN WANG, MIRIAM RAFAILOVICH, JONATHAN SOKOLOV, DILIP GERSAPPE, State University of New York at Stony Brook, NY 11794-2275, ASHISH BAKSHI, Manhasset High School, Manhasset, NY 11030, RAJESH ATLURI, Herricks High School, New Hyde Park, NY 11040, TOHRU ARAKI, YING ZOU, HARALD ADE, North Carolina State Univeristy, Raleigh, NC27695, DAVID LEWIS KILCOYNE, Advanced Light Source, LBNL, Berkeley, CA94720, GAD MAROM, The Hebrew University of Jerusalem, Jerusalem 91904, Israel , ARNOLD LUSTIGER, ExxonMobil Research and Engineering Company, Annandale, NJ 08801 — A decrease in melting temperature for semi-crystalline polyethylene thin films in the vicinity of a substrate was observed. The depression in the melting point increases with increasing surface interaction. The biggest T_m depression is 38°C. We propose a model where the depression is attributed to the attractive force between the substrate and the polymer chains which competes with the ordering force among the polymer chains. In order to determine the universality of the effect, experiments were conducted on other polymers, i.e. polycaprolactone and poly(ethylene oxide) where similar results were obtained. The effects of confinement were then studied by crystallizing the films on patterned surfaces where the dimensionality of the patterns was continuously varied for nanometer to micron scale.

Yantian Wang
State University of New York at Stony Brook

Date submitted: 19 Jan 2006 Electronic form version 1.4