Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Understanding Molecular Epitaxial Mechanism of the γ-form Crystal and Chain Tilt in the α-form Single Crystal of Isotactic Polypropylene YAN CAO, RYAN VAN HORN, GUOLIANG ZHANG, HAO-JAN SUN, The University of Akron, KWANG-UN JEONG, Chonbuk National University Jeonju, FINIZIA AURIEMMA, CLAUDIO DE ROSA, Università di Napoli "Federico II", BERNARD LOTZ, Institut Charles Sadron (CNRS-Université de Strasbourg), STEPHEN CHENG, The University of Akron — We attempt to investigate how the epitaxial domination of the crystal morphologies takes place in the γ-form of the chain-folded crystals using high molecular weight isotactic polypropylene (i-PP) samples with a controlled number of stereodefects. Two different morphologies were identified *via* transmission electron and atomic force microscopies (TEM and AFM). One is needle-like and the other is "flat". Based on the tilted selected area electron diffraction (SAED) results from TEM, the microscopic formation mechanism of the "needle" and "flat" morphology was discussed and it revealed that in the "flat" γ-form crystal, the initial α-form single crystal had to have a stem orientation tilted away from the thin film normal within the ac-plane around the b-axis. Elongated α_2-form lath-like single crystals were grown from thin film melt at $T_x = 145$ °C -155 °C using commercial sample. SAED experimental results show that the stems in these lath-like single crystals were tilted at an unusual 17° angle around the b-axis. This 17°-stem tilt in the α_2-form single crystals favors the $(10\bar{2})$ fold surface and appears to depend upon both conformational and chain folding constraints.

Yan Cao
The University of Akron

Date submitted: 16 Nov 2011 Electronic form version 1.4