Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Structure and Properties of Tactic Hydrogenated Polynorbornenes ADAM B. BURNS, RICHARD A. REGISTER, Princeton University — Tacticity is one of the most important structural parameters for determining the physical properties of a polymer. A high degree of steroregularity typically promotes crystallization, with different tacticities giving rise to differences in crystal structure, melting point, and degree of crystallinity. In polynorbornene (PN) made by ring-opening metathesis polymerization (ROMP), tacticity is determined by the relative configuration of the nonplanar cyclopentylene rings enchained in the backbone. Traditional ROMP initiators yield *atactic* polymers (*a*PN); however, recent advances in catalyst design have produced both *isotactic* and *syndiotactic* PN. Newly reported *cis,isotactic*- and *cis,syndiotactic*-PNs were catalytically hydrogenated (abbreviated *i*hPN and *s*hPN, respectively) without altering the tacticity. The thermal and structural characteristics of *i*hPN and *s*hPN were studied by differential scanning calorimetry (DSC) and wide-angle x-ray scattering (WAXS) and compared to that of *a*hPN. Remarkably, all three polymers are semicrystalline, each with a distinct crystal structure. *i*hPN has a nominal melting point of 165 C, more than 20 C above that of *a*hPN. WAXS patterns of melt-drawn fibers of *i*hPN show few strong reflections indicative of either a highly symmetric unit cell or poor long-range order. *i*hPN fibers also exhibit a crystal-crystal transition near 130 C, which is not fully reversible on subsequent cooling. On the other hand, *s*hPN has a nominal melting point some 15 C below that of *a*hPN, and *s*hPN fibers show no evidence of polymorphism.

Adam B. Burns
Princeton University

Date submitted: 03 Nov 2015 Electronic form version 1.4