

Topological Polymer Chemistry in Pursuit of Elusive Polymer Ring Constructions

Yasuyuki TEZUKA

ytezuka@o.cc.titech.ac.jp
Tokyo Institute of Technology

Remarkable developments in *Topological Polymer Chemistry* have enabled the production of a variety of single-cyclic (ring) and multi-cyclic polymers having programmed chemical structures with guaranteed purity. By making use of these topological polymers, unprecedented opportunities have now been realized to provide new insights on fundamental polymer properties either in solution or bulk, in static or dynamic states, or in self-assemblies. Moreover, unusual properties and functions

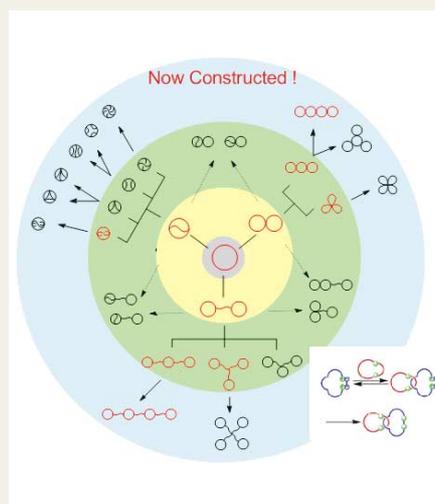
for polymer materials have now been revealed based on their cyclic topologies, i.e., *topology effects*, unattainable either by linear or branched counterparts.

Polymer Preprints, Japan **2011**, 60, 37.

J. Am. Chem. Soc., **2010**, 132, 14790.

Angew. Chem., Int. Ed., **2010**, 49, 1418.

J. Am. Chem. Soc., **2010**, 132, 10251.



Novel Morphology of Nano-Oriented Crystals of Polymers Crystallized by Extreme Melt-Elongation

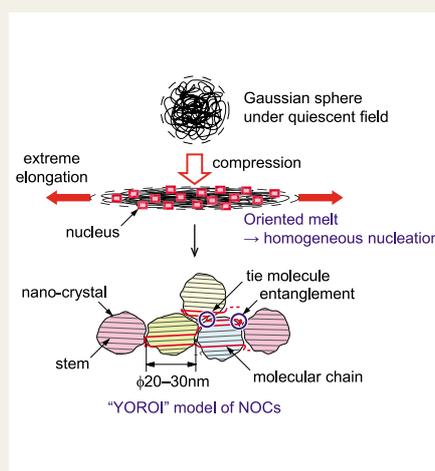
Kiyoka OKADA* and Masamichi HIKOSAKA

kokokiyo@hiroshima-u.ac.jp*
Graduate School of Integrated Arts and Sciences, Hiroshima University

We succeeded in elongating the bulky melt and in creating the novel morphology of “nano-oriented crystals, NOCs”. We compressed the supercooled melt of isotactic polypropylene sandwiched by a couple of plates or rolls. When we increased the elongational strain rate, the crystallization behavior, structure and physical properties discontinuously changed from those of well-known spherulites to those of NOCs at a critical point. The melt should change from

isotropic to oriented melt, which results in change from heterogeneous to homogeneous nucleation. Therefore NOCs were generated. The crystallinity of NOCs was nearly equal to unity and NOCs showed ultra-high performance like high tensile strength and so on. One molecular chain would interpenetrate three-dimensionally and connect nano-crystals more than 10^2 times, which we named “YOROI” model.

Polymer Journal, **2010**, 42, 464.



Preparation of Nanostructured Polymer Particles by Self-Organized Precipitation (SORP) Method

Hiroshi YABU

yabu@tagen.tohoku.ac.jp
Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University

Submicron-sized polymer particles can be prepared by simple evaporation of a good solvent from a polymer solution containing a poor solvent. By using this “Self-Organized Precipitation (SORP)” method, a wide variety of polymer particles can be prepared. The size of particles were controlled by changing preparation conditions including concentration of polymers, mixing ratio of the good solvent and the poor solvent, temperature, and so on. When symmetric block-

copolymer was used for particle preparation, one-dimensionally stacked lamellae phase or onion-like phase were formed in the particles. Moreover, Janus and core-shell type phase separation structures were formed from polymer blend systems. Organic-inorganic composite particles having phase separation structures were prepared from various inorganic nanoparticles and those polymer systems.

Polymer Journal, **2011**, 43, 301

