

February 19-20, 2018
Paris, France

Pierre-J Lutz, J Org Inorg Chem 2018, Volume: 4
DOI: 10.21767/2472-1123-C1-002

FROM ISOTACTIC POLYSTYRENE (IPS) OR POLY(*p*-METHYL STYRENE) TO SEMICRYSTALLINE IPS / POSS HYBRID MATERIALS

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In the present work, the synthesis of iPS is realized by homogeneous catalytic styrene polymerization on a MAO-activated titanium bisphenolate catalyst, in the presence of a non-conjugated diene acting as chain transfer agent (CTA) leading to vinyl-terminated iPS (vinyl-iPS). The polymerization of styrene, with the same catalyst, was also achieved in a cascade of two parallel reactors. Whereas ultra-high-molecular-weight (UHMW) iPS is formed in the absence of the diene, the molar mass M_w decreases with increasing diene/styrene molar ratio. Hence, the contents of iPS and UHMWiPS are varied without affecting the average molar mass of both blend components. The same catalytic system was tested for the coordination polymerization of *p*-methyl styrene. Vinyl-iPS revealed also a highly efficient CTA for the ring-opening metathesis polymerization (ROMP) of cis-cyclooctene, producing polycyclooctene-block-isotactic polystyrene (PCO-b-iPS) as amorphous and semi-crystalline rubber diblock copolymers. Furthermore, crystalline nanostructured inorganic-organic hybrid materials containing isotactic iPS were prepared by means of hydrosilylation coupling of vinyl-iPS with octakis(dimethylsilyloxy)silsesquioxane (Q_8M_8H). As a function of the iPS/ Q_8M_8H molar ratio, the formation of linear or star-shaped hybrid architectures is achieved.

Biography

Pierre-J Lutz is a Professor (Directeur de Recherche Emerite, CNRS) of Polymer Chemistry in Strasbourg. He completed his PhD in Macromolecular Engineering in 1981 from University Strasbourg, France. (supervision P. Rempp). Chargé de Recherche (1981), ICS, (CNRS) postdoc (Prof. H. J. Cantow, Freiburg (Germany)). In 1988, he spent a sabbatical year at the Institute of Macromolecular Chemistry, in Freiburg with Prof. W Burchard as Humboldt Visiting Scientist. In 1996, he was nominated as Directeur de Recherche at the ICS (CNRS-University of Strasbourg). His recent scientific interests are concerned with various polymerization processes structural characterization. From 2012-2015, University of Jena (Germany) (Prof. U. S. Schubert), University of Freiburg (Prof. R. Mülhaupt). Since 2017 Directeur de Recherche Emérite (CNRSHe); has authored more than 170 publications and book chapters and 3 patents. He is a member of the French Polymer Group and the French Chemical Society. He was a member of the American Chemical Society until 2014. His research interests include polymer chemistry- polymers of controlled molecular and structural parameters via ionic polymerization and their characterization; functional homo (or co) polymers including macromonomers, branched polymers, cross-linked polymers, and cyclic polymers (via coordination, living anionic polymerization); complex macromolecular architectures; grafting reactions; self-assembly of block copolymers and; hydrogels designed for biomedical applications. In particular his interests lies in poly(ethylene oxide) (PEO) and related materials designed for biomedical applications; synthesis and characterization of polyethylenes of various molecular architectures and; more recently hybrid polymeric materials.

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