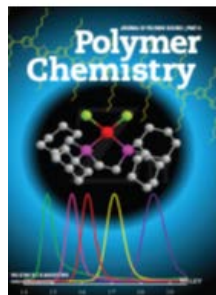
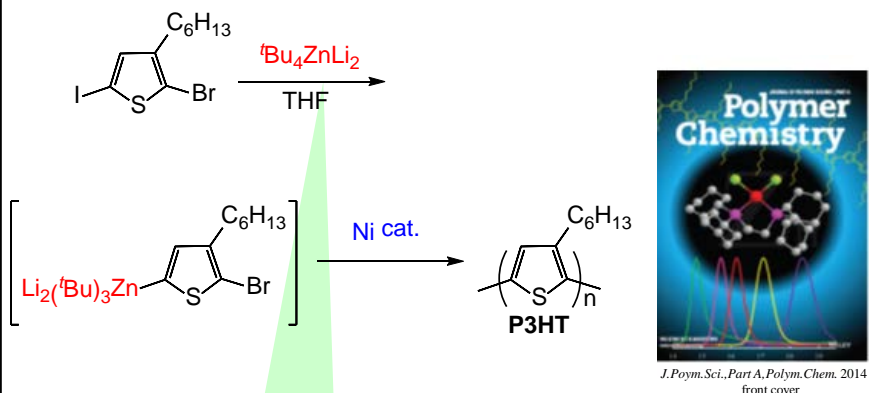


# Design and Synthesis of $\pi$ -Conjugated Polymers

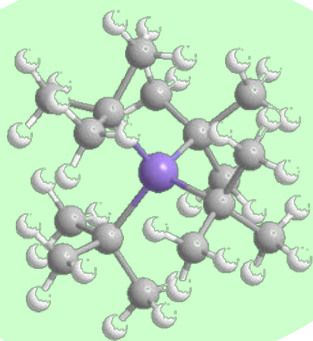
Associate Professor Tomoya Higashihara

## Negishi Catalyst-Transfer Polycondensation

Japanese Patent No. 5585916



*J. Polym. Sci., Part A: Polym. Chem.* 2014  
front cover



Zincate complex

$\text{tBu}_4\text{ZnLi}_2$

Moisture/air stable

## Contents:

It is quite important to utilize well-defined  $\pi$ -conjugated polymers for clarifying relationships among their design, self-assembled nanostructure, and optoelectronic performance. The Negishi Catalyst-Transfer Polycondensation (NCTP) method provides purification/protection-free systems due to the employment of chemically-stable zincate complexes. In addition, the NCTP system brings the polymerization under control in terms of molecular weights (2,400-32,800), dispersities (1.03-1.17), and head-to-tail regioregularity (92-99%). Recently, we have focused on the synthesis and characterization of novel semiconducting elastomers based on ABA triblock copolymers, showing well-balanced properties of hole mobility ( $<10^{-3}$  cm<sup>2</sup>/V/s) and elasticity ( $>300\%$  elongation at break). Other activities include the development of semiconducting polymers suited for organic photovoltaic (OPV) device application. The new design of bithiadiazole(BTDz)-based polymers provides a power conversion efficiency of 8.04% based on bulkheterojunction OPV devices. A packaging system for freshness-preservation of Yamagata fruits has also been specially designed based on hydrogels and 3D printers.

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Research Interest:  $\pi$ -conjugated polymers

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