

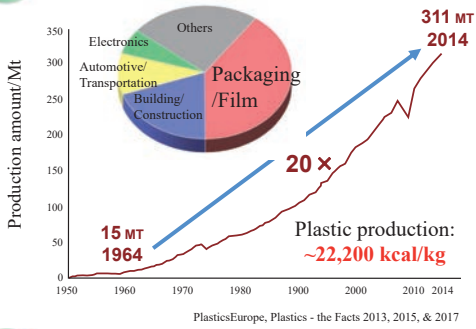
Degradable Plastics with Low-Temperature Formability

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Rapid increase of plastic production



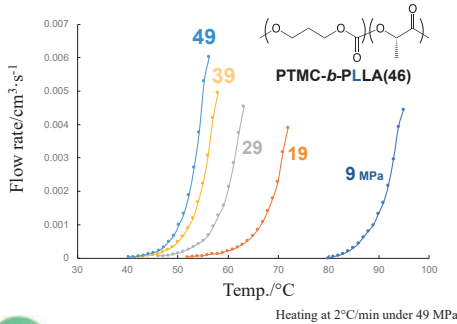
Characteristics

- Protection of fossil resources
- Low-energy processing
- CO₂ mitigation
- Enhanced recyclability
- Environmentally benign
- Sustainable

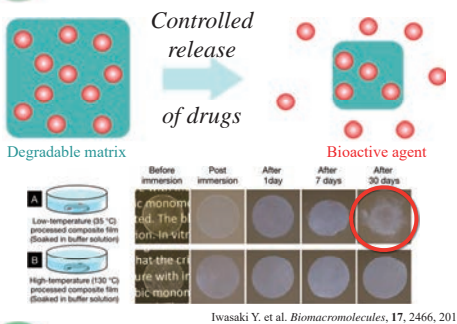


Gonzalez-Leon, J.A., *Nature*, 426, 423, 2003

Effect of applied pressure

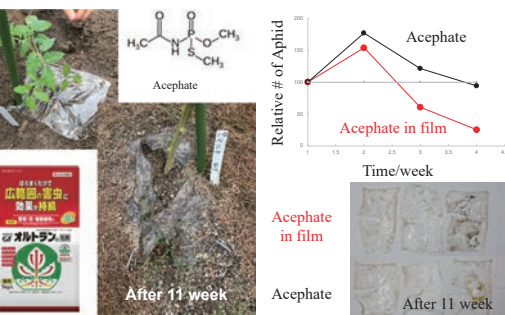


Matrix for drug delivery



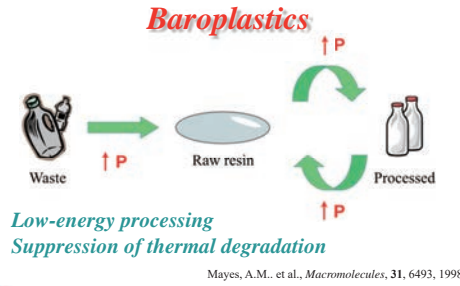
Effect of insecticide

Cultivation of tomato with insecticide-containing film



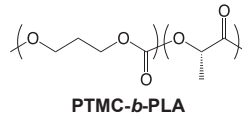
Low-temp. processable polymers

Plastics that flow under applied pressure:



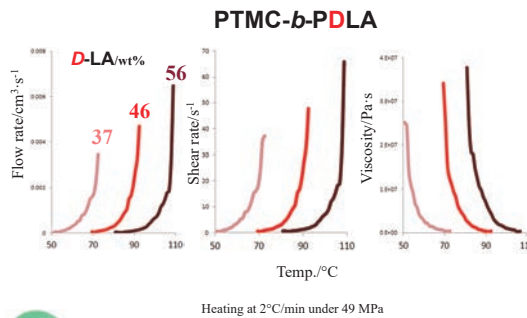
Degradable baroplastics

from Renewables

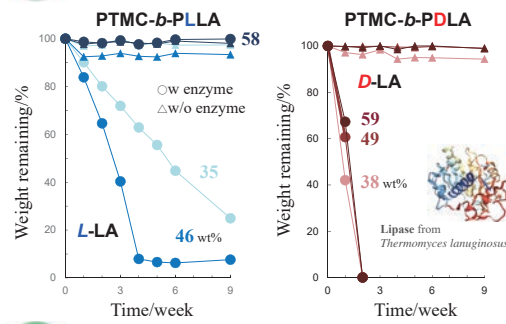


RT extrusion under 49 MPa

Effect of composition

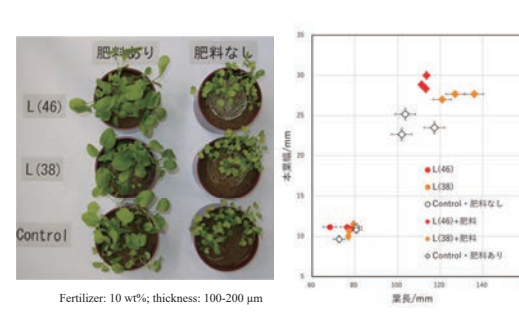


Enzymatic degradability

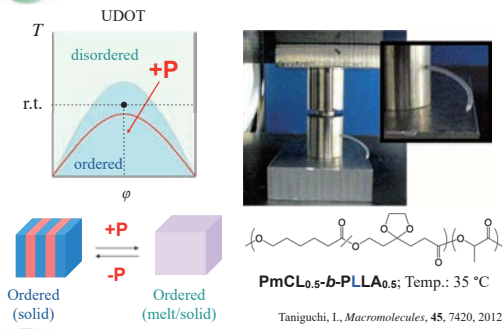


Effect of fertilizer

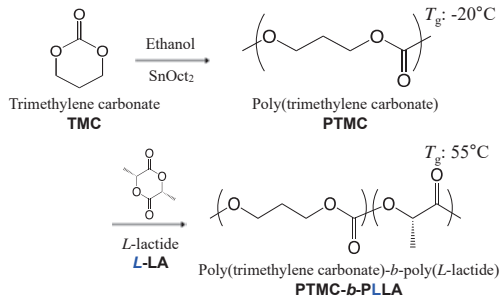
Cultivation of spinach with fertilizer-containing film



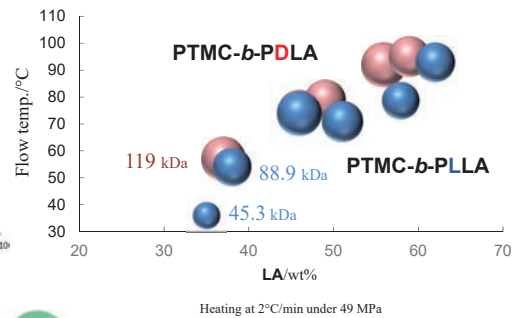
Pressure-induced phase transition



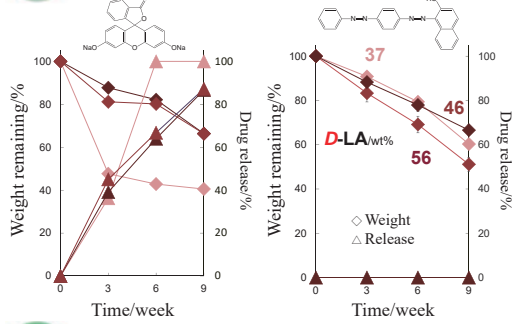
Synthetic scheme



Parameters for pressure processing



Drug release profiles



Summary

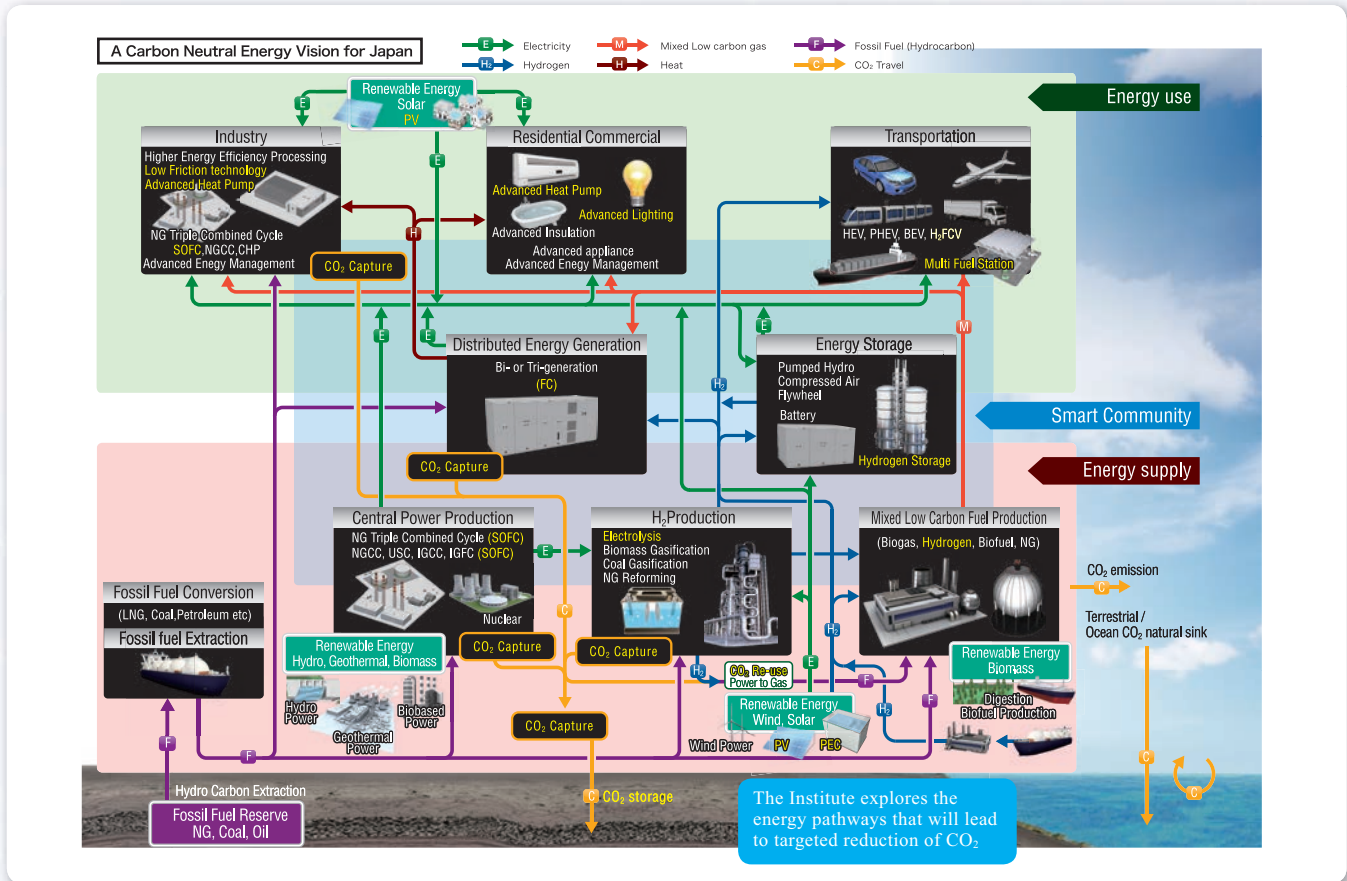
- PTMC-*b*-PLAs can be processed at temperatures as low as room temperature under pressure.
- Low-temperature formability is depended on composition and molecular weight of the block copolymers
- Degradability of the block copolymer is controllable, and thus the polymers hold potential as matrices in drug delivery.

Acknowledgements

Emer. Prof. Yoshiharu Kimura at Kyoto Institute of Technology
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Kyushu University GapFund Program

About I²CNER

I²CNER's mission is to contribute to the advancement of low carbon emission and cost effective energy systems and improvement of energy efficiency. The array of technologies that I²CNER's research aims to enable includes Solid Oxide Fuel Cells, Polymer Membrane based fuel cells, biomimetic and other novel catalyst concepts, and production, storage, and utilization of hydrogen as a fuel. Our research also explores the underlying science of CO₂ capture and storage or the conversion of CO₂ to a useful product. Additionally, central to I²CNER's mission is the establishment of an international academic environment that fosters innovation through collaboration and interdisciplinary research (fusion).



Parameter Space of Technology Options

World Premier International Research Center Initiative (WPI)



Background

An intensifying global demand for talented researchers is accelerating the need among the world's nations to develop the best scientific minds. This trend has prompted Japan to establish new research centers that attract top-notch researchers from around the world so as to place itself within the "circle" of excellent human resources.

Program Summary

The World Premier International Research Center Initiative (WPI) provides concentrated support to establish and operate research centers that have at their core a group of top-level investigators. The objective of these centers is to create a research environment of a sufficiently high standard to give them a very visible presence within the global scientific community—that is, to create a vibrant environment that will provide a strong incentive to frontline researchers around the world to want to work at these centers.

The WPI program has four basic objectives: advancing leading-edge research, creating interdisciplinary domains, establishing international research environments, and reforming research organizations. To achieve these objectives, WPI research centers are required to tackle the following challenges:

Critical Mass of Outstanding Researchers

- Bringing together top-level researchers within a host research institution
- Inviting top-notch researchers from around the world

Attractive Research and Living Environment of Top International Standards

- Strong leadership by center director
- English as the primary language
- Rigorous system for evaluating research and system of merit-based compensation
- Strong support function
- Facilities and equipment appropriate to a top world-level research center
- Housing and support for daily living and education of dependent children

To assist the WPI research centers in carrying out this mandate, the Japanese government provides them with long-term, large-scale financial support.