Development of Multi-Lock Biopolymers Degradable in Ocean From Non-Food Biomasses

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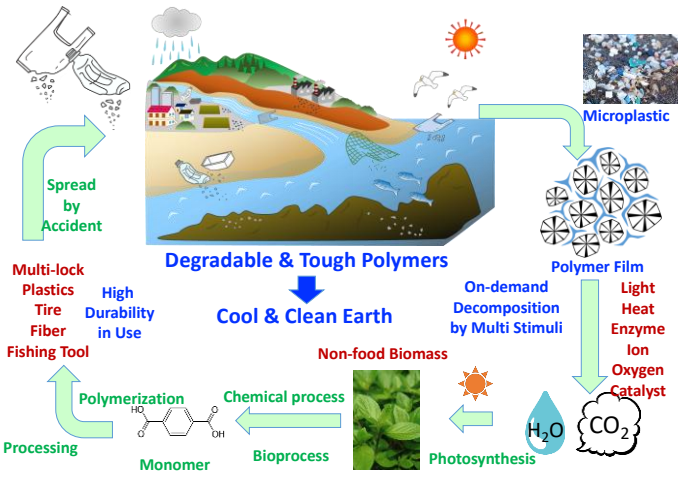
Summary

In this project, we will introduce a multi-lock mechanism into decomposition of polymeric materials to break the trade-off. This mechanism will require more than one external stimuli such as light, heat, oxygen, water, enzyme, microorganism, catalyst, etc. simultaneously to decompose polymeric materials, resulting in inhibiting degradation of polymers to keep their toughness at the point of use. If such polymers spread in the environment by mistake, the multi-lock mechanism will enable a facile on-demand switching decomposition of them. Our targeted commercial products are plastics, tires, fibers, fishing nets, and fishing goods whose raw materials are non-food biomasses. By closely collaborating between industry, government, and academia that have gathered into this project, we will establish novel concept regarding decomposition of polymeric materials, which will lead to a guiding principle for material design of multi-lock biopolymers.

The established technologies in this project will be transferred to Japanese companies having superior proprietary technology, where commercialization of the transferred technologies will be promoted through the effort for mass production and cost reduction. We are confident that we will be able to make a valuable contribution to solving the global environmental problems through the commercialization of the technologies that will be obtained as the fruits of this project.



Targets by 2030

FY2022: Elucidation of the decomposition mechanism is promoted in academia, and each company collaborates with academia about each target material of four species to determine the molecular and material design that achieves both the multi-lock type degradability and toughness.
FY2024: Each company works more deeply with academia on the target material to achieve each target (e.q., over 5 times larger degradability or toughness) of the multi-lock biopolymer.
FY2029: Each company achieves higher targets and focuses on establishing commercialization technology of multi-lock biopolymers using non-food biomasses for prompt implementation after the end of PJ.

Implementation

The University of Tokyo, Mitsubishi Chemical Corporation, Bridgestone Corporation, Teijin Limited, Kureha Corporation, Kyushu University, Nagoya University, Yamagata University, Research Institute of Innovative Technology for the Earth (RITE), National Institute of Advanced Industrial Science and Technology (AIST), Ehime University, Tokyo Institute of Technology