



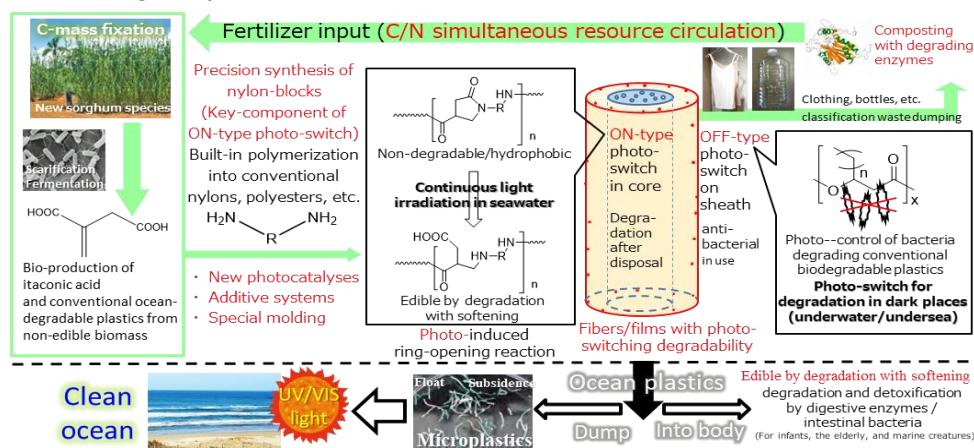
Development of Photo-Switching Ocean-Degradable Plastics With Edibility

Project Manager (PM) :
 Dr. KANEKO Tatsuo, Japan Advanced Institute of Science and Technology
 Contact : kaneko*jaist.ac.jp
 To send an email, please change * to @ in the above email address.

Summary

The development of new plastics is planned which show sufficient durability in use but exhibit photo-switching degradability under bright sunlight in marine environment, in order to contribute to the countermeasures against the global problem of ocean-plastic wastes. Specifically, the following three photo-switches will be developed.

- 1) ON-type photo-switch: This switch is equipped with stable materials but after dumping the materials become biodegradable in the marine environment where the sunlight irradiates the plastics in seawater (ON). Furthermore, the plastics should be softened and decomposed in the digestive tract of human and animals, causing no physical or chemical damages.
- 2) OFF-type photo-switch: A photo-switch that suppresses biodegradation (OFF) in the presence of electric lamps or sunlight, and begins biodegradation in dark environments such as underwater, seabed, and compost.
- 3) ON/OFF-type photo-switch: An ideal system equipped with the above two photo-switches. In 2030, we will prove the degradability in the real marine-environments and develop prototypes such as clothing and plastic bags. By 2050, the system will be applied to a wide range of plastics to contribute to carbon dioxide fixation, carbon and nitrogen cycles.



Targets by 2030

- FY2022: Clarification of basic principles of photo-switching biodegradability, establishment of basic technology of biomass production of raw materials, development of evaluation method of degradability, safety and business feasibility at lab level.
- FY2024: Development of plastics with photo-switching degradability using biomass-derived composition that guarantees degradability, safety, and business feasibility
- FY2029: Development of prototypes and establishment of commercialization base for social implementation of biodegradable plastics with photo-switching degradability and safety on which the resource recycling system from biomass is established.

Implementation

Japan Advanced Institute of Science and Technology, Kobe University, Nagoya University, Kagoshima University, Tokyo University of Science, Tokyo University of Agriculture and Technology, National Institute of Advanced Industrial Science and Technology, Osaka Research Institute of Industrial Science and Technology.