Yamagata University
Control of Higher-Order Structure and Toughness of Marine Degradable Polymers through Polymer Processing

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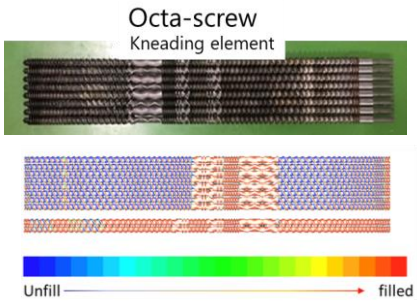
Yamagata University has been conducting materials research on various polymer alloys, blends, and composites by means of special polymer processing technologies.
In this project, we will conduct the following two missions to achieve structural control and toughening of marine degradable polymers.

1. Propose optimal processing conditions/new processing methods in polymer processing technology
2. Support the practical application and commercialization of processing methods to realize tougher polymers through collaboration with participating research institutes and companies.

In our research on the polymer alloy and composites using octa-screw melt kneading extruder, we have attempted to modify various polymers and have succeeded in creating high toughness polymer blends by applying additives and functional polymers (e.g. polyrotaxane) through long reactive processes.

Based on our knowledge, we will evaluate the processability of new marine degradable polymers (film drawing, melt spinning, injection molding, etc.) and control the higher-order structure to create materials that maintain sufficient industrial properties for normal use and on-demand degradation.

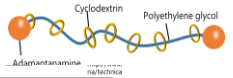
Octa-screw kneading machine

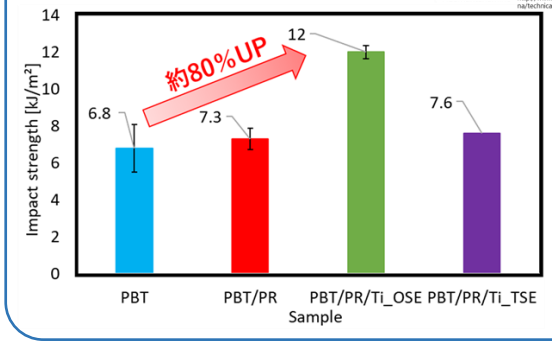


Optimization of octa-screw kneading process and CAE flow analysis

Effects of kneading time and reaction promoter on impact value

Polyrotaxane (PR) is an elastomer containing Cyclodextrin (CD) as a cyclic molecule.





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