

## Research and Development of Degradable Supramolecular Polymers with Both Multi-lock Mechanism and Toughness

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In polymeric materials, there is a trade-off between toughness and degradability, and it is generally difficult to achieve both at the same time. We are trying to improve the toughness and marine biodegradability of polymeric materials by using polyrotaxane as an additive for various polymeric materials. Polyrotaxane is a necklace-shaped supramolecule, and it is known to disperse local stress by sliding of cyclic molecules, suppressing crack propagation and improving tear strength of materials. In fact, the addition of 5% polyrotaxane to poly(lactic acid) increased the elongation at break by more than 20 times. In addition, since polyrotaxane is composed of marine biodegradable molecules such as cyclodextrins and polycaprolactones, its use as an additive is expected to promote the biodegradability of polymeric materials.

