

The degradation of segmented polyurethane films under the effects of UV irradiation and marine microorganism

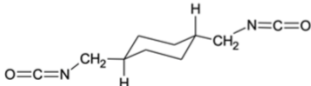
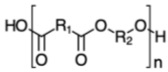
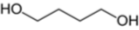
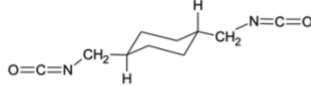
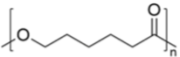
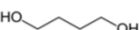
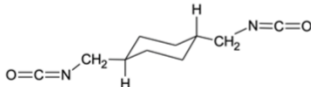
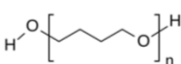

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Abstract

Microplastic contamination is a worldwide environmental problem, caused by a huge amount of used plastic products that have been discharging into the ocean, river, lake and agricultural land. The most popular plastics which were consumed in the world are polypropylene (PP), polyethylene (PE), and polyurethane (PU). However, the degradation of the plastic productions, especially in the natural environment, is still unclear. Here, we focus on the degradation of three segmented PU types (SPUs) (**Table.1**), including oligoester, polycaprolactone (PCL), and polytetramethylene ether glycol (PTMG) based SPUs.

Table 1. The compositions and thermal properties of the investigated PUEs

SPU's type	Diisocyanate (1,4-H ₆ XDI)	Polymer glycol	1,4-butanediol (Chain extender)	Anti-hydrolysis agent	Soft segment T _g (°C)
Oligoester-based SPU				Yes	-45.6
PCL-based SPU				Yes	-45.1
PTMG-based SPU				No	-66.5

In this presentation, I introduce the experimental setup to simulate the effects of UV irradiation from sunlight and natural seawater on plastics. Then, the degradation of the investigated SPUs under the effects of UV irradiation and in seawater, which was sampled in the Imajuku seaside area, will be discussed. The experimental results suggested that PCL-based SPU was stable under UV irradiation, but it was biodegradable by the microorganism in the seawater. In contrast, oligoester-based SPU and PTMG-based SPU had low biodegradability in the seawater. The mechanism of these differences will also be proposed and discussed in my talk.