

**Morphological Study on Degradation of  
Poly(tetramethylene succinate) Single Crystals  
and Spherulites**

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The aliphatic polyesters have been reported to have good degradable properties under natural environmental circumstances. On the basis of morphological features of poly(tetramethylene succinate)(PTMS) single crystals and spherulites which had been observed in our previous work<sup>1)</sup>, we could performed the work about the changes of crystalline region during polymer degradation. After specimen were treated by buffer solution, we investigated the changes of micromolecular structure and perfectness of single crystals by DSC and X-ray diffraction method and the shape of single crystal lamellar by TEM. It was found that perfectness of PTMS crystals reduced with treatment time. The lamellar thickness was decreased till middle time range of treatment and increased almostly to the thickness of original samples in the last time. The reason for decreas of lamellar thickness could be related to the surface amorphous region of lamellar and the increase could be depende on the recrystallization at the temperature of degradation treatment, 50°C. The wide angle X-ray diffraction results revealed that the d-spacing of the treated specimen were wider than that of original and that crystallinity were increased with increasing of treatment time.

The molphology of PTMS spherulite was also observed by optical

microscopy. The spherulites crystallized at temperature between 60°C ~ 80°C showed ringed type. In the spherulites, the gray band and the white band are showed in turns. By the insertion of the first-order red plate, we found out that the gray band and the white bands correspond to positive and negative birefringence, respectively. Spherulites crystallized at 90°C showed a mixed form of positive and negative types of birefringence and at this temperature, the ring pattern was disappeared. We could observed the defects in the spherulite after treatment by buffer solution. There were cracks on the surface of spherulites.. The direction of cracks were vertical to the radial direction of spherulites. These phenomena were found not only at the ringed spherulites crystallized at temperature below 80°C but also at coarse branching radial structure crystallized at temperature above 90°C. It was found very often that the crack direction was a little inclined, 15° ~20° ,to absolute tangential direction.

#### Reference

- (1) K. J. Ihn, E. S. Yoo and S. S. Im, *Macromolecules*, Vol. 28, No.7, 1995