

TA1006 - Microplastics (MP) characterization by TG-DSC

Introduction

Microplastics (MP) are defined as used plastic particle of <5 mm that have leaked into the environment and currently exist as pollutant in soils, oceans and rivers ⁽¹⁾. Most of the MPs found oceans are polyethylene (PE), polyethylene terephthalate (PET), polypropylene (PP), nylon, etc ⁽²⁾. During recent years, research on MP has increased and we are able to differentiate various plastics thru their melting point obtained by TG-DSC measurement.

Measurements and results

Figure 1 shows the comparison of the TG-DSC measurement results of a mixed polymer (HDPE, PP, Nylon 6 and PET) material cut in small pieces of 2 mm~<5 mm in size; and individual polymer samples of HDPE, PP, Nylon 6 and PET. Measurement was carried out in 2~10 mg sample amount and heated up to 300°C at 10°C/min under Nitrogen flow. The results reveal endothermic peaks due to melting at 126°C, 164°C, 221°C and 251°C in the mixed polymer sample, that correspond to the melting behavior of each of the polymers. Therefore, if the plastic has melting peaks that can be observed individually at different temperatures, we are able to identify the MP from the melting temperature with DSC.

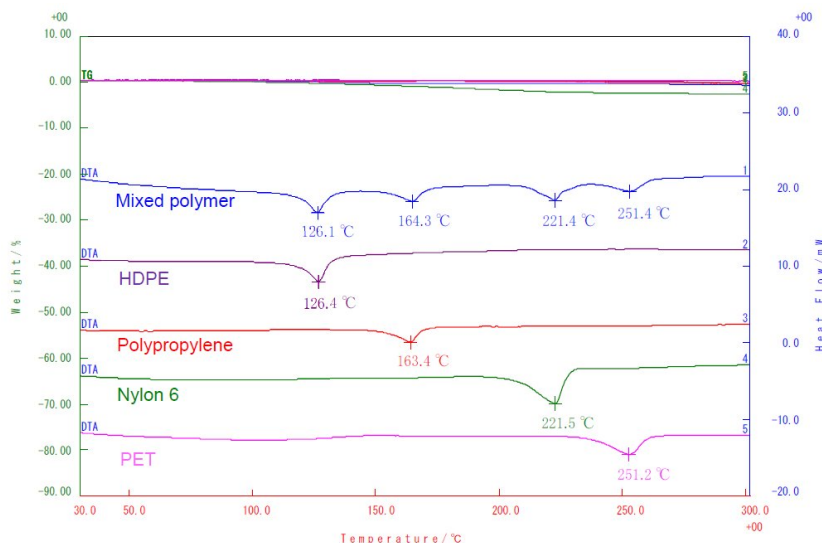


Figure 1: STA results of mixed polymer and individual standard polymer samples.

References

- (1) M. Majewsky, H. Bitter, E. Eiche and H. Horn. *Science of Total Environment* **568** (2016) 507-511
- (2) J. Yu, et. al.,. *Marine Pollution Bulletin* **145** (2019) 153-160