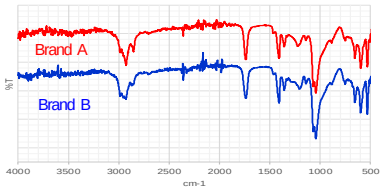
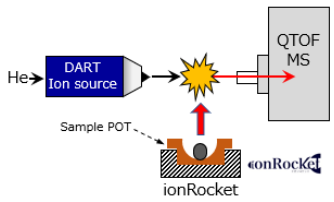
Rapid discrimination of foreign objects : PVDC plastic wraps from different manufactures

■Introduction

Food wrap film, also known as cling film or plastic wrap, is widely used for food processing and packing, leading the risk that wrap might be introduced as a foreign object/ foreign matter within the food item itself. While some vendors have switched to making food wrap from Low-Density Polyethylene (LDPE) for environmental reasons, many still make food wrap from PVDC (Polyvinylidene chloride). Since multiple vendors might use food wrap at different stages during manufacturing of food items, the ability to discriminate between food wrap made by different manufactures could help identify the source of contamination. FT-IR is frequent choice for rapid analysis for foreign matter, but in case FT-IR cannot discriminate between PVDC films made by different manufactures(Fig. 1), thus FT-IR would not be suitable in this case.
In this application, ionRocket equipped with Direct Analysis in Real Time-Mass Spectrometry(DART®-MS) was capable of discriminating between PVDC films made by different manufactures. This method is suggested to be a rapid and effective in the investigation of foreign object in food processing and packing.



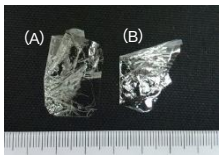
【**Fig. 1** : FT-IR spectra】

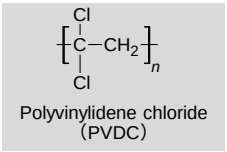


【**Fig. 2** : ionRocket DART-MS system】

■Samples

Two kinds of PVDC food wrap films
(Brand A and Brand B)





Polyvinylidene chloride
(PVDC)

■Method

ionRocket combined with QTOF-MS equipped with DART ion was used as analytical system for this application(Fig. 2). A small piece of sample (ca. 0.5 mm^2) was put into the ionRocket sample POT. A temperature gradient of 100 ℃/min. from room temperature to 600 ℃ was applied (total run time:7 min.).

■Results

In the FT-IR spectrum shown in Fig. 1, the material could not be identified with “PVDC” due to the influence of plasticizer. Also FT-IR showed no difference between two samples. In the TIC shown in Fig. 3, no significant difference between two samples. Fig. 4 shows the mass spectra acquired at 200-300 ℃. The samples can be distinguished by using additive marker, as different additives were detected in each samples. Additives were easily identified by using industrial additive database “Compound Search” (BioChromato). Fig. 5 shows the mass spectra acquired at 300-400 ℃. Pyrolysis products of PVDC were detected in both samples, however, the detection intensities of pyrolysis products around *m/z* 450 are different, indicating that while both samples are PVDC, they do not share the same composition.

■Summary

It is possible to identify and discriminate between PVDC films by using additives as markers via ionRocket DART®-MS. Therefore, this analytical method is useful for not only the detailed examination of foreign object contamination pathways but also for QC and forensic discrimination. Moreover, ionRocket DART®-MS enabled rapid identification between the same material’s products which can not be identified by FT-IR.

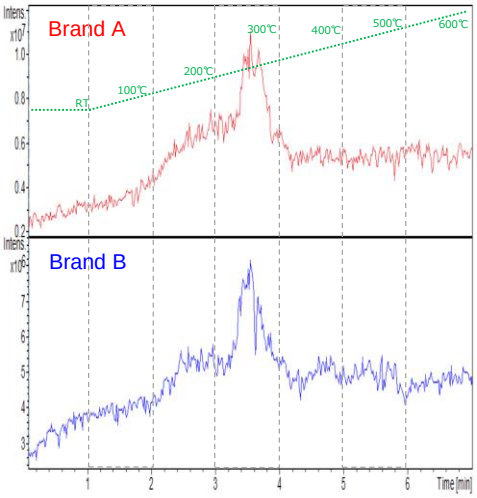


Fig. 3 TIC
DART Positive mode

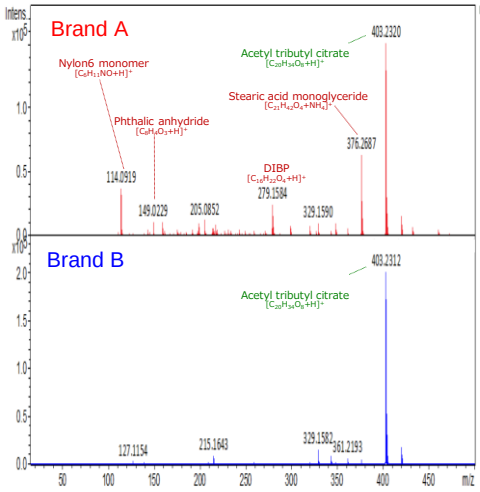


Fig. 4 Mass spectra
DART Positive mode, around 200-300 ℃

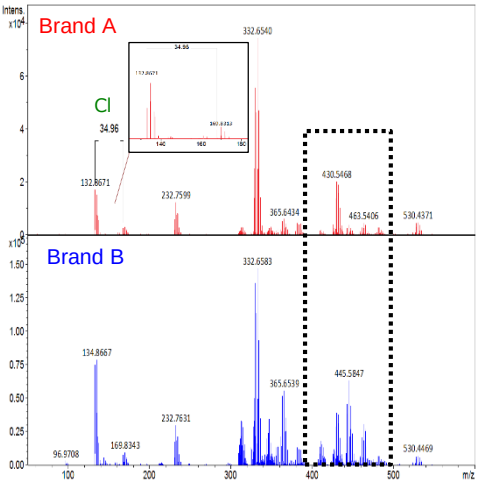


Fig. 5 Mass spectra
DART Negative mode, around 300-400 ℃

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