

Analysis of advanced materials by FD/FI using “AccuTOF GC” Part IV

~ analysis of NIR-photosensitive dyes ~

Introduction

Field desorption (FD) is an ionization method utilizing electron tunneling effect in a high electric field near the emitter surface or whisker tip. Sample is applied on the emitter and heated by applying an electric current through the emitter for desorption and ionization.

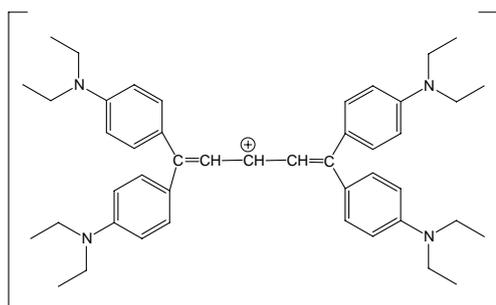
FD has been used to analyze nonvolatile compounds, polymers, etc. as soft ionization method, which yields intact molecular ions with very few fragment ions in most cases.

We have analyzed near infrared ray (NIR) photosensitive dyes that are designed as photoinitiators for the polymerization of functional polymers by FD.

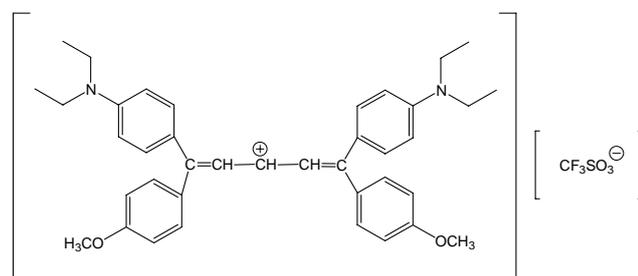
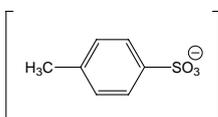
Methods

● Samples

NIR photosensitive dyes (Showa Denko K.K.)



(1) IRT ($[C_{45}H_{59}N_4]^+[C_7H_7SO_3]^-$)



(2) IR13F ($[C_{39}H_{45}O_2N_2]^+[CF_3SO_3]^-$)

MS conditions

Mass spectrometer:	JMS-T100GC “AccuTOF GC”
Acquired mass range:	m/z 30 – 900
Spectral recording interval:	0.3 sec
Ionization mode:	FD+
Cathode potential:	-10 kV
Emitter current program:	0 mA → 51.2 mA/min → 40mA

Results and discussion

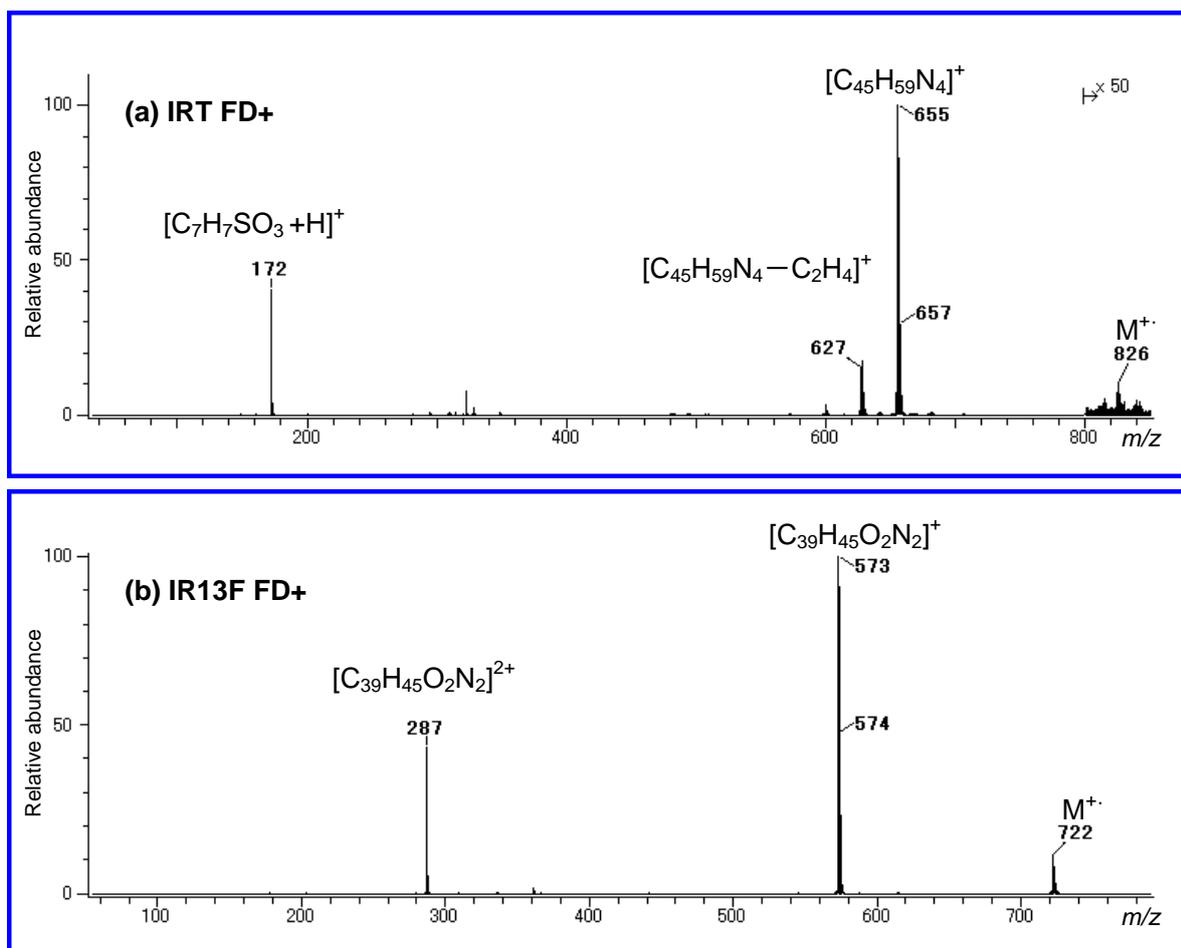


Fig. 1 FD+ mass spectra of NIR photosensitive dyes

Molecular ions $[(\text{Anion})(\text{Cation})]^+$ were observed for both samples by using FD.

For the sample IRT, the cation part of the salt was detected as the base peak at m/z 655 as shown in Fig. 1 (a) above. In addition, $[(\text{Cation}) - \text{C}_2\text{H}_4]^+$ at m/z 627 and $[(\text{Anion}) + \text{H}]^+$ at m/z 172 were observed.

For the sample IR13F, the cation part of the salt was detected as the base peak at m/z 573 and the molecular ion at m/z 722 was relatively strong. As a characteristic ion of this sample, m/z 287 which is double-charge ion of the cation of the salt, has been observed.

For the analysis of salts, FD was found effective in detecting cation of the salt with good sensitivity.

Acknowledgement

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