

Detection of molecular ions from OLED material using AccuTOF GC

Introduction

Organic electroluminescence, (Organic EL, Organic Light Emitting Diode, OLED, we use "Organic EL" hereafter) is a light emitting phenomenon by exciton generated by recombination of electron holes and electrons which were injected in organic substance. Application to displays and illuminations is expected. At the moment, it has been commercialized for small displays, such as a sub-display of a mobile phone, and its research has been on-going for practical applications comparable to those of a liquid crystal display and a plasma display.

Field desorption (FD) is an ionization method utilizing electron tunneling effect in high an electric field near the emitter whisker tip and is known as a very soft ionization method. It gives very simple mass spectra with little fragmentation and, therefore, interpretation of a mass spectrum from a mixture is easy. Since no sample vaporization is required, it is suitable for the analysis of thermally labile compounds. We have analyzed an organic EL material by FD using AccuTOF GC time-of-flight mass spectrometer.

Methods

Mass spectrometer JMS-T100GC
Sample Bis-(2-methyl-8-quinolinolate)-
4-(phenylphenolate)aluminium (BAIq)
(Luminescence Technology Corp.)

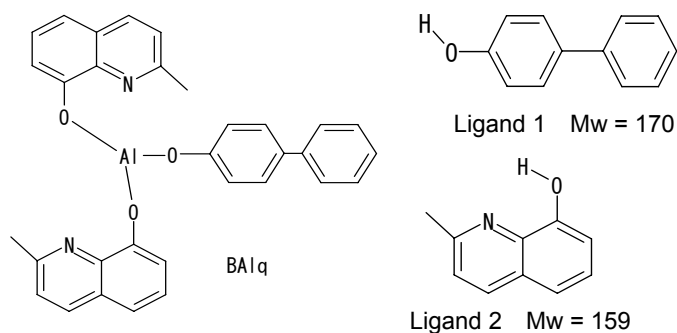


Fig. 1 Organic EL material and its ligands

Results and discussion

As shown in Fig. 2, the molecular ion was observed as the base peak at m/z 512. Two peaks observed in the low mass region are those from the ligands. The peak at m/z 501 is that from a complex consists from three Ligand 2 molecules and Al. The structure of an organic EL material, an aluminum complex, was readily confirmed using soft FD ionization.

FD Probe Condition	
Emitter	10 μ m (Carbotec)
Rising Current Rate	51.2mA/min
Maximum Current V	50 mA
Sample Concentration	0.3 mg/ml
Sample Volume	1 μ L
MS Analysis Condition	
Ionization Mode	FD(positive)
Countercurrent	-10 kV
Electrode Voltage	
Analysis Time	1.2 min
Mass Range	m/z 3-1500
Spectrum Recording Interval	0.4 sec

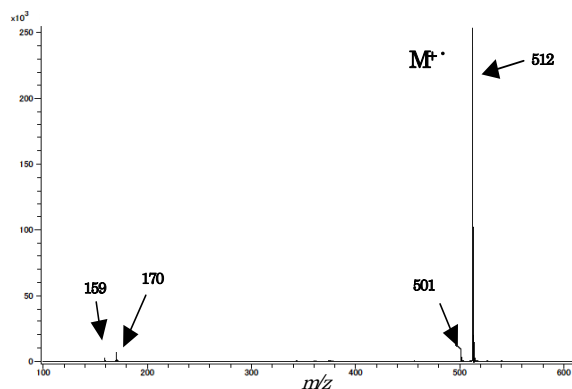


Fig. 2 FD mass spectrum of BAIq