Introduction
Field desorption (FD) is an ionization method that utilizes electron tunneling in a high electric field near the emitter surface or whisker tip. Sample is applied directly onto the emitter and is then heated by applying an electric current through the emitter for desorption and ionization. FD has been used to analyze nonvolatile compounds, polymers, etc. as a soft ionization method that produces intact molecular ions with very few fragment ions in most cases.

In this work, we used FD to analyze several quaternary borate ammonium salts that are designed as photoinitiators for the polymerization of functional polymers.

Methods
Samples: Quaternary orate ammonium salts (Showa Denko K.K.)

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 → 40 mA

Results and Discussion
Molecular ions [(Anion)(Cation)]⁺ were not detected for all three quaternary borate ammonium salts. The quaternary ammonium cation at m/z 242 ([C₁₆H₃₆N]+) was observed as the base peak for all samples. The ions that correspond to the [(Anion) – H]⁺ were observed for all samples, though they are relatively weak. For BP3B and N3B, ions that correspond to the [(Anion) – C₄H₉]⁺ at m/z 410 and at m/z 392, respectively, were also observed.

Conclusions
With FD, the cation part of salts was clearly detected for these quaternary borate salts. Additionally, we found that the anion part of the salts can be detected as a de-protonated cation.

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Fig. 1 FD+ mass spectra of organic borate ammonium salts