

# Structural analysis of OLED components by TOF-SIMS MS/MS

Newly introduced our TOF-SIMS MS/MS provides useful data for detailed molecular structure determination of components in OLED multilayer. It is particularly useful for the analysis of dopants and component of thin layer with a thickness of a few nm.

## TOF-SIMS

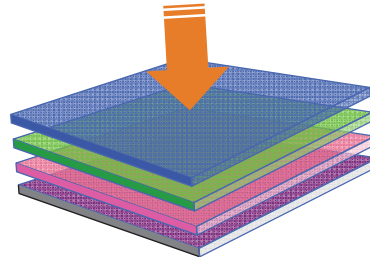
- **Specific information**
  - Chemical structure information of organics
  - Surface analysis (nm)
  - Microanalysis ( $\mu\text{m}$ )

- × **Complicated spectra**
  - Mixture of components
  - Many fragment ions

- × **Difficult interpretation**
  - Unpredictable spectra
  - Insufficient reference spectra

## TOF-SIMS MS/MS

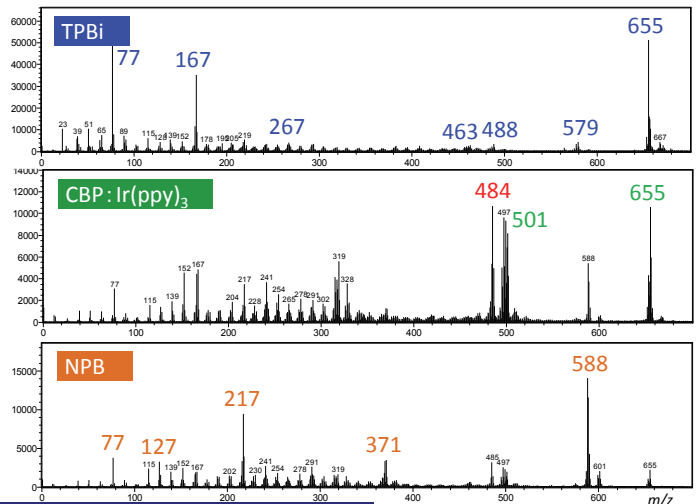
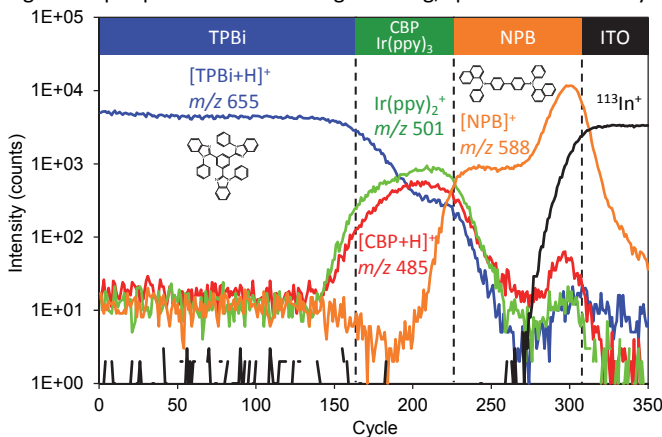
MS/MS spectrum of each single component  
→ better interpretation of results



Al/TPBi/CBP : 6% Ir(ppy)<sub>3</sub>/NPB/ITO  
→ Peeling of cathode  
→ GCIB-TOF-SIMS  
→ TOF-SIMS MS/MS

## GCIB-TOF-SIMS of OLED multilayer

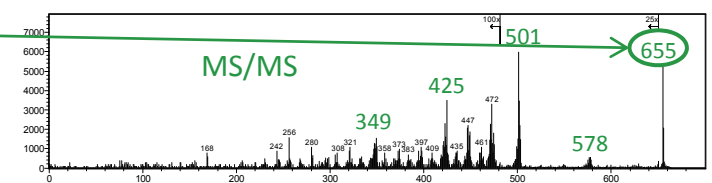
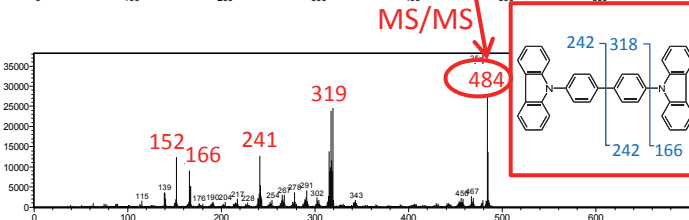
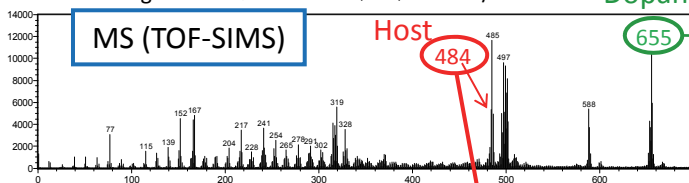
Organic depth profile in low-damage etching, spectrum of each layer



## Molecular structure determination of host and dopant by TOF-SIMS MS/MS

GCIB etching to EML → TOF-SIMS (MS) and MS/MS

Dopant



- Layer thickness: 30 nm.
- Concentration of dopant density: 6%
- MS/MS data is very helpful to determine molecular structures of host and dopant.
- This dopant can be analyzed even at the concentration less than 1%.

- TOF-SIMS MS/MS analysis of each components provides useful data for the detailed molecular structure.
- MS/MS analysis is usually applicable even to low concentration constituents of about 1%.
- It is particularly useful for the analysis of dopants and component of thin layer with a thickness of a few nm, which is difficult to separate in GCIB-TOF-SIMS profile.