BEIS (Boost efficiency IS) - High sensitivity ion source for GC-MS/MS -

MS Business Unit, Analytical & Measuring Instruments Division
Market trend of GC-MS/MS
- In the past, Dioxins in food had been analyzed by GC-HRMS
- Recently, GC-MS/MS was also confirmed as official method (EU589/2014)
- The market will grow in Europe, Asia and Africa where export food to Europe

Trend of regulation for POPs analysis by GC-MS/MS
- EU
  - Dioxins in food and feed sample
  - Dioxins in environmental sample
- China
  - Dioxins in food and feed sample
  - Dioxins in environmental sample
- Taipei
  - Dioxins in food and feed sample
  - Dioxins in environmental sample

Not published yet
Market trend of Dioxin analysis (in EU)

- ML is getting lower and lower

### Background

**Food and Feed**

<table>
<thead>
<tr>
<th></th>
<th>Maximum level</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Conc. in sample</td>
</tr>
<tr>
<td>Pigs fat</td>
<td>1,00 pg/g fat</td>
</tr>
<tr>
<td>Vegetable oils</td>
<td>0,75 pg/g fat</td>
</tr>
<tr>
<td>Foods for infants and young children</td>
<td>0,10 pg/g wet weight</td>
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</tbody>
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High sensitivity ion source is necessary
Features of BEIS (Boost efficiency IS)

- **Improve the structure of ion source**
  - Diameter of electron gun was optimized
  - Ionization efficiency was much improved

1. Boost up sensitivity of your analysis
2. Realize high reliable analysis for Dioxins
Boost up sensitivity of your analysis

- Increase the sensitivity for 3 – 4 times

**Analysis result of DXNs**

1,2,3,7,8-Pentachlorodibenzo-p-dioxin (0.05 pg/uL)

BEIS

Prev.

Octafluoronaphthalene (1 fg)

2,3,7,8-Tetrachlorodibenzofuran (0.05 pg/uL)

BEIS

Prev.

Spec. (IDL) of the ion source

<table>
<thead>
<tr>
<th>Company</th>
<th>Model</th>
<th>Spec.</th>
</tr>
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<tbody>
<tr>
<td>SHIMADZU</td>
<td>TQ8050NX+BEIS</td>
<td>OFN : IDL ≤ 0.3fg</td>
</tr>
</tbody>
</table>
Realize high reliable analysis for Dioxins

- Realize high sensitivity analysis even if use low emission current

2,3,7,8-Tetrachlorodibenzo furan
BEIS with 150μA  Prev. with 300μA

1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin

BEIS  Prev.

1,2,3,7,8-Pentachlorodibenzo furan
BEIS  Prev.

Octachlorodibenzo furan
BEIS  Prev.
Realize high reliable analysis for Dioxins

- Keep the sensitivity over than 500 injection in Dioxin analysis

Transition of the sensitivity of STD (0.05 pg/uL)

Transition of Peak Area (PCDD)
Note

- **Lifetime of Filament**
  - Filament make much more electron than previous when use the same emission current.

  ![Diagram](image)

  *Lifetime of filament may be shorter*

  ![Graph](image)

  **BEIS is suitable for POPs analysis especially Dioxins.**

  **For other applications (such as pesticides in food), the sensitivity is enough even if use current ion source. We should recommend current ion source because of filament lifetime.**
Fin.