These are the articles selected by Shimadzu for this issue. The articles are from application notes relating to Food safety and Environment with a variety of instruments we produce. The cutting edge technologies are also included. Please obtain the articles of your interest through the links on the titles.

**Analysis of Melamine and Its Related Substances in Fertilizers**

Recently, it has been confirmed that some granulated products of hydrated calcium cyanamide, which are created by adding water to calcium cyanamide, contain a significant amount of melamine. This article introduces an example of the analysis of melamine and related substances in fertilizers using an HPIC system, with reference to the fertilizer test methods (2012) under the supervision of the Japan’s Food and Agricultural Materials Inspection Center (FAMIC).

**Rapid and Highly Sensitive Quantitative Analysis and Screening of Aflatoxins in Foods Using Liquid Chromatography Triple Quadrupole Mass Spectrometry**

A new high throughput LC-MS/MS method was developed to facilitate increased testing for carbendazim in orange juice at low ppb levels. A gradient reversed phase high speed method was developed for the analysis of carbendazim on a 2.1 x 30 mm 3.5 micron core-shell column coupled to a tandem quadrupole mass spectrometer. The use of UHPLC with a high speed injector allowed an analysis to be completed within a one minute timeframe.

**DNA Analytical Technology to Identify the Actual Composition of Foods Application of the “MultiNA” Microchip Electrophoresis System**

Recently, methods to identify the actual composition of various foods have been developed because of progress in gene-analyse technology. An electrophoretic pattern required for this type of analysis can be obtained by using MCE-202 MultiNA Microchip Electrophoresis System. Examples of analysis data obtained using MultiNA to identify species of meat, tuna, and rice are shown.

**High-Speed Analysis of Amino Acids and Histamine in Fish Sauce via Automated OPA Pre-column Derivatization**

Processed foods and fish containing a significant amount of histamine have resulted in several cases of allergic food poisoning. In Japan, no standard values have been set for histamine concentrations in fish. However, the FDA has specified levels of 50 mg/kg max. for foods in general, the EU has specified 100 mg/kg max. for marine products, and the Codex Alimentarius standard specifies 400 mg/kg max. for fish sauce.

**Development of new fNIRS-EEG system for seamless whole brain study**

Functional near-infrared spectroscopy (fNIRS) is a valuable functional neuroimaging technology with non-invasive method of monitoring of brain activity. fNIRS has high potential: for such research topics according to the high temporal/spatial resolution compared to fMRI or EEG. We developed a new fNIRS-EEG system which allows seamless whole brain measurement of the surface of the human brain, high spatial resolution measurement, multi-distance measurement, and high temporal resolution measurement.
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### Food Safety

**Rapid and Highly Sensitive Quantitative Analysis and Screening of Aflatoxins in Foods Using Liquid Chromatography Triple Quadrupole Mass Spectrometry**

Aflatoxins (Afs) are the most harmful mycotoxins produced by the fungi Aspergillus flavus and Aspergillus parasiticus and can contaminate foods such as cereals and nuts. To reduce the risk of the ingestion from foods, analyses of the Afs are carried out in many countries. In this study, we examined two alternative high-throughput LC-MS/MS methods.

**High Throughput LC-MS/MS Analysis of Carbendazim in Orange Juice**

A new high throughput LC-MS/MS method was developed to facilitate increased testing for carbendazim in orange juice at low ppb levels. A gradient reversed phase high speed method was developed for the analysis of carbendazim on a 2.1 x 50 mm 3.5 micron core-shell column coupled to a tandem quadrupole mass spectrometer. The use of UPLC with a high speed injector allowed an analysis to be completed within a one minute timeframe.

### Food Identification

**DNA Analytical Technology to Identify the Actual Composition of Foods Application of the "MultiNA" Microchip Electrophoresis System**

Recently, methods to identify the actual composition of various foods have been developed because of progress in gene-analysis technology. An electrophoretic pattern required for this type of analysis can be obtained by using MCE-202 MxMNA Microchip Electrophoresis System. Examples of analysis data obtained using MxMNA to identify species of meat, tuna, and rice are shown.

**High-Speed Analysis of Amino Acids and Histamine in Fish Sauce via Automated OPA Pre-column Derivatization**

Processed foods and fish containing a significant amount of histamine have resulted in several cases of allergic food poisoning. In Japan, no standard values have been set for histamine concentrations in foods. However, the FDA has specified levels of 50 mg/kg max. for foods in general, the EU has specified 100 mg/kg max. for marine products, and the Codex Alimentarius standard specifies 600 mg/kg max. for fish sauce.

### Food Evaluation

**Evaluation of Foods for People with Dysphagia**

In recent years, there has been an increase in people with dysphagia due to an aging population, so the demand for these communications has increased. This article introduces a system for measuring hardness, adhesion, and agglomeration, evaluation items based on the Consumer Affairs Agency of Japan’s Food Labeling Notification No. 277 (Permission of Labeling for Foods for Special Dietary Uses).

### Environment

**Analysis of Melamine and Its Related Substances in Fertilizers**

Recently, it has been confirmed that some granulated products of hydrogenated calcium cyanamide, which are created by adding water to calcium cyanamide, contain a significant amount of melamine. The article introduces an example of the analysis of melamine and related substances in fertilizers using an HPLC system, with reference to the fertilizer test methods (2012) under the supervision of the Japan’s Food and Agricultural Materials Inspection Center (FAMIC).

**Development of Solid-Phase Extraction Method for Simultaneous Analysis of Semi-Volatile Organic Compounds Using a GC-MS Database System**

Environmental pollution caused by a variety of chemicals is drawing attention to the need for a more efficient method of simultaneous multicomponent analysis. In this research, we investigated the use of solid-phase SVOC extraction, which requires the use of less solvent. Here, an analytical method developed for comprehensive analysis of SVOCs in water samples using AIQS-DB is reported.

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**Development of New Ionization Detector for Gas Chromatography by Applying Dielectric Barrier Discharge**

A new gas chromatographic detector, dielectric barrier discharge ionization detector (BID), has been developed by applying atmospheric non-equilibrium plasma to a photo ionization source. The relation between the type of dielectric barrier discharge and its stability, and the influence on the baseline stability by outgassing from the discharge cell were clarified.

### New Technology

**Development of Iodoacetyl-Based Ionic Mass Tags for Improved Sensitivity in the Detection of Cysteine-Containing Peptides by MALDI-TOF MS**

We developed and characterized six new ionic mass tags that bond to cysteine residues and enable high-sensitivity analysis of peptides. We analyzed peptides for their MS sensitivity using the new mass tags and achieved improvements in sensitivity of approx. 2 to 200 times the sensitivity obtained with a carbamide-methylated peptide control sample.

**Development of HyperVision HPV-X High-Speed Video Camera**

We developed the HPV-X high-speed video camera, which incorporates the FTCMOS high-speed sensor based on the technology of CMOS image sensor. It can capture images without decreasing the spatial resolution at high-speed capturing. This paper describes the HPV-X and applications of high-speed photography.

**Development of new FNIRS-EEG system for seamless whole brain study**

Functional near-infrared spectroscopy (FNIRS) is a valuable functional neuroimaging technology with non-invasive method of monitoring of brain activity. FNIRS has high potentials for such research topics according to the high temporal/spatial resolution compared to fMRI or EEG. We developed a new FNIRS-EEG system which allows seamless whole-brain measurement of the surface of the human brain, high spatial resolution measurement, multi-distance measurement, and high temporal resolution measurement.