

Portable Mass Spectrometer Developed to Support Investigations of Drugs of Abuse

-Contributing to improve the reliability of drug investigations with a quick, accurate and compact mass spectrometer-

Hitachi High-Technologies Corporation (TOKYO: 8036, Hitachi High-Tech) announced today the development of a portable mass spectrometer (*1) prototype that offers quick and accurate detection of drugs of abuse, with the ability to be carried around directly to drug investigation sites and detecting drugs of abuse onsite.

According to the United Nations Office on Drugs and Crime's World Drug Report 2011, in recent years the numbers of the users of drugs of abuse continues to take a heavy toll and some 210 million people use drugs of abuse globally each year. The consumption of combinations of drugs rather than just one substance is becoming more common, and several new synthetic compounds have emerged in drugs of abuse markets. This situation has driven the need for a quick and accurate method for detecting the presence of drugs of abuse in order to curb this problem.

In this context mass spectrometers, which are already used for the main forensic appraisal of drugs of abuse, have gained attention as a superior approach versus other detection methods for their outstanding performance in detecting drugs of abuse and their compatibility with a wide range of such substances. However, the device weight of a typical mass spectrometer can reach over 100 kg (220 lb), and requires specialist knowledge for proper operation. These and other drawbacks have thus far prevented the use of such devices for onsite detection of drug investigations.

Hitachi High-Tech has developed and refined mass spectrometry technology over many years in the physical and chemical sciences field. To develop a new business based on the mass spectrometry technology, Hitachi High-Tech set out to create a mass spectrometer which was lighter and more compact, quicker, and easier to use. Working under the "R&D Program for Implementation of Anti-Crime and Anti-Terrorism Technologies for a Safe and Secure Society", Special Coordination Funds for Promoting Science and Technology and Strategic Funds for the Promotion of Science and Technology of the Ministry of Education, Culture, Sports, Science and Technology, the Japanese Government, Hitachi High-Tech, in partnership with the National Research Institute of Police Science (President: Hirofumi Fukushima), the University of Yamanashi (President: Shuichiro Maeda), the Kobe Gakuin University (President: Toyoki Okada), and the Research & Development Group of Hitachi, Ltd. (President: Hiroaki Nakanishi), developed a portable mass spectrometer prototype that can be easily carried to drug investigation sites.

The device weighs in at around 10 kg(22 lb) by incorporating a number of innovations, including a newly developed ultra-compact mass spectrometry module, an ultra-compact and high-sensitivity ion source, and a drastically lighter evacuation system by using a discontinuous measurement sample introduction system. The unit also has an internal battery allowing for about one hour of operation. Using a novel unique algorithm, the device can automatically detect the presence of amphetamines, synthetic narcotics (MDMA, MDA) and other drugs of abuse contained in a sample in less than 5 minutes, then displays the name of the drugs detected onscreen. The portable mass spectrometer is also equipped with an automated tandem mass spectrometry function (*2) capable of detecting amphetamines and synthetic narcotics in urine, a previously difficult challenge, in concentrations as small as 0.1 parts per million (ppm).



Exterior view of the portable mass spectrometer prototype

From fiscal 2009, Hitachi High-Tech initiated the C project (Challenge/Corporate Project) system, a scheme designed to generate new businesses that will drive its operations in the future. The newly developed portable mass spectrometer is slated to be the first product commercialized under the C project system.

In fiscal 2012, we will witness the roll out of the portable mass spectrometer as a marketable product and, with the cooperation of Japan government agencies responsible for investigations of drugs of abuse, will see demonstration trials for the device take place at actual investigation sites. Furthermore, Hitachi High-Tech aims to develop new business solutions that apply the mass spectrometry technology to efforts to ensure public safety and security globally.

Details regarding the newly developed portable mass spectrometer prototype are scheduled to be introduced through research presentations and seminars during TIAFT 2012 (The International Association of Forensic Toxicologists), hosted in the Act City Hamamatsu, Shizuoka Prefecture, Japan from Monday, June 4th to Saturday, June 9th, 2012.

(*1) Mass spectrometer: A device that analyzes the makeup of a given sample by transforming the molecules and other particles of the sample for measurement into ions, which are then separated by mass by electrical and magnetic fields within a vacuum.

(*2) Tandem mass spectrometry: A method that allows for more accurate specification of the makeup of a sample by taking ions of a specific mass following mass separation, breaking them down by forcing the ions to collide through application of an electrical field, then performing mass separation on the dismantled ions to estimate their molecular structure.

<Website>

: TIAFT 2012 (50th Conference of The International Association of Forensic Toxicologists)
<http://www.secretariat.ne.jp/tiaft2012/>

*To participate in the Hitachi High-Tech's seminar at TIAFT 2012:

(Japanese page)

<http://www.hitachi-hitec.com/science/exhibit/tiaft2012.html>

(English page)

<http://www.hitachi-hitec.com/global/whatsnew/2012/20120606.html>

: 96th Congress of the Japanese Society of Legal Medicine (Japanese)

<http://www.jslm.jp/jslm96/>

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