

FOR IMMEDIATE RELEASE

23rd March 2010

Hitachi, Ltd.

Development of Compact 150-cc Mass Spectrometer for Detecting Microscopic Water Particles in Breath

-Combined with an Alcohol Sensor, Able to Detect Alcohol in
Breath from a Distance of 50cm-

Tokyo, Japan, 23rd March 2010 --- Hitachi, Ltd. (NYSE : HIT/TSE : 6501, hereafter Hitachi) today announced that it has developed a compact 150cc (75mm (*h*) × 50mm (*w*) × 40mm (*d*)) mass spectrometer for detecting water clusters in human breath. The equipment ionizes water clusters in atmosphere to give them electric charge and analyzes mass based on the property that water-cluster movement differs according to water-cluster size under the influence of buoyancy, air resistance, gravity, and electric fields.

Conventional mass spectrometry ionizes component molecules and analyzes the movement of ions in a vacuum necessitating the use of a vacuum pump. In contrast, the newly developed equipment applies an electric field to water clusters in atmosphere and instantaneously separates positive and negative ions. This dispenses with the need for a vacuum pump resulting in a significantly smaller equipment. Further, as this new mass spectrometer can detect water clusters in human breath from a distance of about 50 cm, when combined with existing alcohol sensors, should enable stringent detection of breath alcohol.

In the future, it is expected that this equipment will find applications in driver operation/work management environments, beginning with the automotive industry.

In recent years, studies especially in relation to automotive applications, have been conducted on ways to measure breath alcohol levels without requiring the user to perform any special kind of action. Existing compact sensors such as semiconductor alcohol sensors, however, cannot easily determine whether the detected alcohol is actually contained in breath. There is a need, therefore, for a compact breath sensor that could be combined with existing alcohol sensors.

Human breath can be detected from various types of data such as air flow and temperature/humidity, but to strictly prove the presence of human breath, the characteristic components of breath such as nitrogen, oxygen, carbon dioxide, and moisture must be checked for. While methods that use mass spectrometry exist for performing precise analysis of components in breath, conventional mass spectrometry requires the use of ionizing equipment to ionize component molecules and a vacuum pump to analyze ion movements in a vacuum. This makes it difficult to achieve a compact unit.

To overcome these limitations, Hitachi has successfully developed a compact mass spectrometer for detecting the mass of water clusters in breath without the use of a vacuum pump. This equipment features the following technologies.

(1) Mass spectrometry for water clusters, requiring no vacuum pump

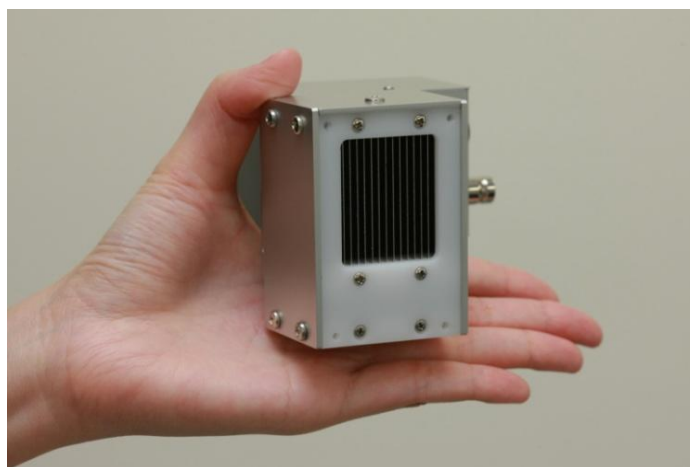
On applying an electric field to water clusters contained in human breath, positive and negative ions are instantaneously separated in atmosphere. The water clusters which take on a electric charge by ionization, were found to move differently according to their size under the influence of buoyancy, air resistance, gravity, and electric fields. Making use of this property, a method was developed to analyze water clusters in atmosphere by mass spectrometry.

(2) Prototype compact mass spectrometer

Using the method described above, a compact 150cc (75mm (*h*) × 50mm (*w*) × 40mm (*d*)) mass spectrometer was developed. When this equipment was combined with a conventional alcohol sensor to investigate its sensitivity, water clusters in breath were detected from a distance of about 50 cm, demonstrating that such a combination can be used to stringently identify alcohol in human breath.

In the future, it is expected that this equipment will find applications in driver operation/work management environments, beginning with the automotive industry.

The results of this research were presented on the 18th March at the 2010 National technical convention of the Institute of Electrical Engineers of Japan, which was held from 17th to 19th March 2010 at Meiji University, Tokyo, Japan.



Compact mass-spectrometer developed

■ About Hitachi, Ltd.

Hitachi, Ltd., (NYSE:HIT / TSE:6501), headquartered in Tokyo, Japan, is a leading global electronics company with approximately 360,000 employees worldwide. Fiscal 2009 (ended March 31, 2010) consolidated revenues totaled 8,968 billion yen (\$96.4 billion). Hitachi will focus more than ever on the Social Innovation Business, which includes information and telecommunication systems, power systems, environmental, industrial and transportation systems, and social and urban systems, as well as the sophisticated materials and key devices that support them. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.

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