

Commencement of Joint Research Exploring Applications for and Commercializing Key Components of Palm-sized Gas Chromatograph

Ball Wave Inc. (headquarters: Sendai City, Miyagi Prefecture (Japan); CEO: Shingo Akao; hereinafter “Ball Wave”) and GL Sciences Inc. (headquarters: Shinjuku Ward, Tokyo; President: Yoshihiro Nagami; hereinafter “GL Sciences”) have commenced joint research exploring applications for and commercializing key components of the palm-sized gas chromatograph*¹, which is a product of Ball Wave.

■ Background

Ball Wave has developed a high-sensitivity high-precision palm-sized gas chromatograph (Fig. 1) for multiple species of volatile substances, and began selling a palm-sized (A5 size) gas chromatograph (product name SYLPH) in April of this year.



Figure 1. The palm-sized high-performance gas chromatograph “SYLPH”

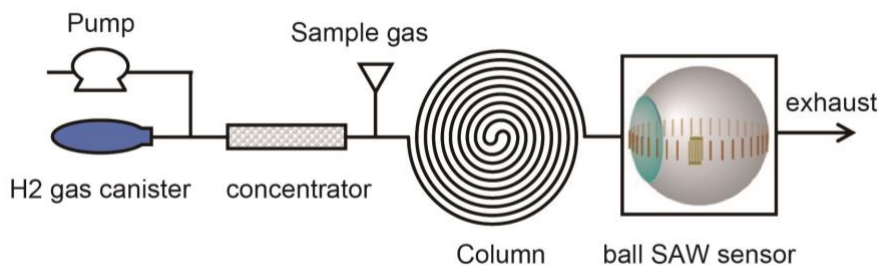


Figure 2. Structure of Gas Chromatograph

■ Joint research

Ball Wave and GL Sciences have begun joint research with the aims of investigating commercialization of the metal MEMS column*2, which is a key component of the Ball Wave palm-sized gas chromatograph, and to evaluate and explore applications for the ball SAW sensor*3, which is a key technology of Ball Wave (refer to Fig. 2).

■ Applications of palm-sized gas chromatograph

The palm-sized, high-performance gas chromatograph (SYLPH) is expected to be used for many applications in various fields, including energy, industry, agriculture, forestry, fisheries, and healthcare, as shown below:

- Energy/industrial fields: Constituent analysis for evaluating the calorific value of natural gas, constituent analysis of gases discharged from binders and electrolytes during the fabrication and use of lithium batteries, VOC analysis, abnormal odor screening, etc.
- Agriculture, forestry, fisheries fields: Reduction of food losses by early detection of deterioration of foods such as fresh fish, fruits, vegetables, and food oils, as well as fermentation process monitoring by aroma analysis of alcohol products and soy sauce, etc.
- Healthcare field: Detection of sick house gases in living environments and contaminants in soil, disease detection by analysis of various bodily gases (exhalation, body odor, intestinal gas), etc.



Gas constituent analysis of manufacturing



Wholesomeness and ripeness checking of fresh food



Fermentation process



Screening for hazardous gases and abnormal odors

Figure 3. Use cases of “SYLPH”, palm-sized high-performance gas chromatograph

■ Specifications of palm-sized gas chromatograph

Detection method	Ball SAW sensor
Column	Metal column (solenoid type)
Carrier gas	Hydrogen (consultation required for helium, air)
Condenser adsorbent	TenaxTA
Gas sampling	Built-in gas sampling mechanism
Detection limit	5 ppb (xylene)
Startup time	Around 5 min
Measurement time	Around 7 to 8 min
Detectable gas species	C4 to C15 hydrocarbons (Inorganic materials are not currently possible)
Usage temperature	10 to 40°C
Power supply	100 to 240 VAC, 50/60 Hz
Power consumption	20 W or less
External dimensions	13 × 18 × 8 cm
Weight	Around 1 kg

■ About Ball Wave Inc.

Ball Wave is a venture company that was launched by Tohoku University. The company aims to bring about a safe, secure, clean, and sustainable society through the use of the ball SAW sensor, a chemical sensor² developed by the university as an early-stage, innovative technology. The ball SAW sensor is capable of rapid, highly sensitive detection of trace amounts of moisture and various different gases. It combines the high resistance to temperature, pressure, and corrosion of quartz balls with approximately 100 times the sensitivity and response speed of conventional sensors. Ball Wave is currently working on the development, manufacture, and sale of trace moisture meters and gas chromatographs equipped with ball SAW sensors.

■ About GL Sciences Inc.

GL Sciences Inc. has been developing, manufacturing, and supplying analysis equipment and related consumables to companies and research institutions involved in analysis since its foundation in 1968. Recently, the importance of carbon neutrality through SDGs has been growing, and GL Sciences has been working on the development of products related to contributing to carbon neutrality. With the demand for analysis equipment to become smaller and have a reduced load on the environment per analysis in the future, the development of devices and consumables that can perform analysis using a small amount of energy in a small space is inevitable, and GL Sciences is working on



developing metal MEMS columns and ball SAW sensor applications by utilizing the knowledge, technology, and products that they have accumulated over many years.

*1 A gas chromatograph is an analytical instrument that measures a wide range of species and concentrations by the phenomenon in which a mixed gas becomes temporally separated as it passes through a flow channel (called a column) in which a hollow tube is wound around a reel. These are generally large table-top devices. Although portable types have also been developed, they are inferior to large models in terms of sensitivity and accuracy.

*2 A highly durable microfabricated column developed by Tohoku University that replaces the fragile and easily breakable silicon columns with resilient metal in small plate-shaped columns. The new columns are fabricated using a microfabrication technology called micro electro mechanical system (MEMS)

*3 A surface acoustic wave (SAW) is defined here as a vibration that propagates concentrated at the surface of a solid as it is transmitted across the surface of a ball. The phenomenon was discovered by Professor Emeritus Yamanaka et al. at Tohoku University.

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