

## Device for Measuring Airborne Particles

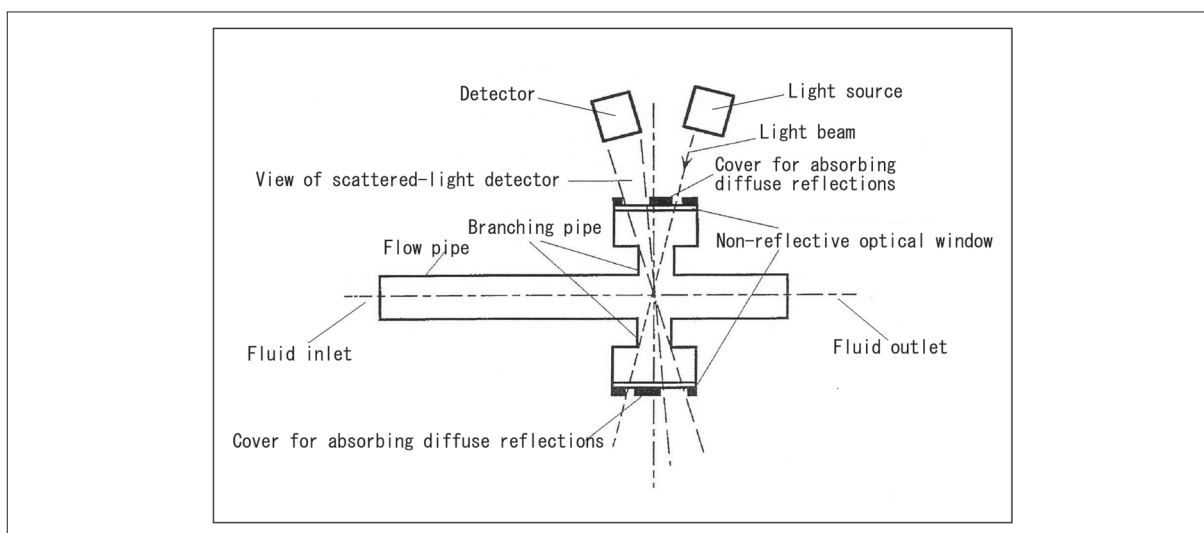
Invented by : *HIROMOTO Norihisa*



External appearance of Real-time Asbestos Monitor

### Overview of the technique

This invention implements optical real-time detection of various particles suspended in the air using the scattering characteristics of particles and identifies the shape and type of these airborne particles. In principle, the apparatus allows for movement of fluid through a flow pipe and into branching pipes, irradiates light beams through the branch pipes diagonally to the direction of the flow, and performs measurement with scattered-light detectors placed on the opposite side. By changing the angle of the attached branch pipes, the scattering angle may be varied from near-forward scattering to near-back scattering, in addition to 90-degree scattering. Here, a non-reflective optical window is attached to the edge of each branch pipe, creating a tight seal, and a cover is placed over the non-reflective optical window to absorb diffuse reflections, so that only scattered light is detected. In this manner, it is possible to detect extremely small particles as well as particles with small scattering intensity. This invention permits the detection and identification of different types of airborne particles in real time via a simple mechanism and allows for analysis of particle properties, also in real time. Thus, it is expected to lead to significant improvement in the early detection and identification of asbestos fibers or hazardous particles included in exhaust gas from vehicles or factories.



Schematic diagram

## Background to Development of Real-time Asbestos Monitor

Asbestos, condemned as the cause of diseases such as lung cancer and malignant mesothelioma, is used in many buildings in Japan. As asbestos particles may be scattered in the air when these buildings are demolished, the use of monitoring equipment has been called for. However, the conventional method involves visually counting asbestos fibers particles collected using a filter with the aid of a microscope, as shown in Fig.1, which takes a significant amount of time. Further, the results vary according to the individual counting the particles. To address these problems, we developed a Real-time Asbestos Monitor over the course of five years beginning in 1991, through a research grant from the Environmental Agency aimed at studies on preventing pollution to be conducted by national organizations (Fig.2). We built a prototype and used it to perform tests and measurements. Development progressed smoothly, but demand was not high at the time so the monitor was not commercialized. Beginning in June 2005, however, the media began to focus on the health hazards of asbestos fibers on a near-daily basis, and demand expanded suddenly among wrecking companies, the fire department, and the police. It was therefore decided that Scm Inc., which has been responsible for production at the time of development, would be called upon to establish a production system to provide the monitor for the previously abandoned sales program.

### Further improvement through support program

A program to foster application of research results was founded in 2005 as an in-house commercialization support initiative within NICT. A plan was launched based on this program to improve the reliability of the Real-time Asbestos Monitor for the market. To maintain reliability in this type of device, regular post-sales maintenance is necessary, including calibration. Shibata Scientific Technology Ltd. will thus assist in calibration, working alongside ESCOM Inc., which will remain responsible for production. The two companies will work in cooperation to develop the commercial product based on the prototype. We hope that in this endeavor NICT's technology will prove useful in solving the asbestos problem.



Fig.1 Asbestos fibers measurement based on conventional method (using a hand-held counter)

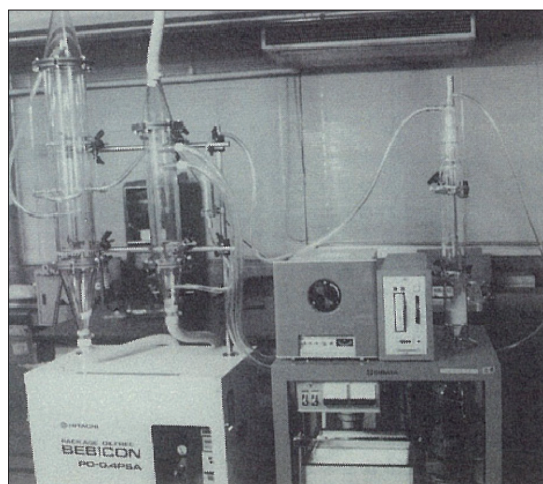


Fig.2 Development scenario (Device that uniformly generates asbestos fiber in air)

Patents Obtained by NICT may be used for a fee.  
Please contact NICT Intellectual Property and Alliance Division  
for information on patent licensing and technical data.