Tohoku Univ. Technology

Biophotoacoustic spectroscopy system

Noninvasive method for measuring blood sugar level without blood sampling

Overview

Although invasive methods involving blood sampling are the mainstream methods for blood glucose measurement in diabetic patients, it is desirable to develop non-invasive methods that do not cause physical pain or risk of infection from the puncture site. As one of the non-invasive measurement methods, a method using a microphone to detect acoustic waves generated when a measurement object is irradiated with light has been proposed. However, the above method has a problem that it is easily affected by environmental sounds and water vapor generated from living organisms.

This invention is a method for measuring blood glucose levels by a transducer method using a piezoelectric element to detect ultrasonic waves generated when a measurement object is irradiated with midinfrared light. The advantage of the transducer method is that it is not easily affected by environmental sounds and water vapor, which are problems in the microphone method. Furthermore, the photoacoustic cell used in the microphone method is not required, allowing for a simpler system configuration. It is expected that this invention makes it possible to measure blood glucose levels simply and non-invasively.

Product Application

- Blood glucose meter
- **D** Cholesterol measuring device

IP Data

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Sugar and lipid components are detected by fingertip measurement



Blue: Method of this invention (measurement result of fingertip) Dips of 1,040 cm-1 derived from C-OH vibrations and 1,080 cm-1 by C-H bond in lipids and carbohydrates were observed.

Related Works

[1] Ryota Sasaki et al., "Analysis of biological components by mid-infrared photoacoustic spectroscopy using a piezoelectric transducer" Materials of the Society of Electrical Engineers of Japan. OQD = The papers of technical meeting on optical and quantum devices, IEE Japan/Workshop on Optical and Quantum Devices [ed.] 2022 (1-6), 25-29, 2022.3.28

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