

New to NMT

Analysis of Multi-sensor Detection Function in Non-damage Micro-measurement System

Hongjian Gao *

Xuyue (Beijing) Technology Co., Ltd., 100080

Recently, I am studying an article ^[1] by Professor Wang Guangce of the Institute of Oceanography, Chinese Academy of Sciences. This article uses the non-invasive micro-measurement system (hereinafter referred to as NMT system) to detect the H⁺ and O₂ flow rates of *Zostera marina* (eelgrass). Interestingly, in this study, the flow rates of H⁺ and O₂ were obtained by simultaneous detection of the same site of the sample using hydrogen and oxygen sensors, which is very rare and innovative. However, today we will not talk about the scientific significance of dual-sensor detection. Let's talk about what is multi-sensor, as well as the questions and misunderstandings in the process of selecting multi-sensor functions.

I. Concept

Multi-sensor detection, also known as multi-channel detection or multi-electrode detection, refers to the function of NMT system to detect several or more ionic molecules simultaneously for the same sample. It usually includes three-sensor detection, four-sensor detection, multi-sensor detection, etc.

II. Classification

The multi-sensor detection of NMT system is mainly divided into two categories:

1. Use multiple sensors to simultaneously detect different parts of the same sample or different sites of the same part.
2. Using multiple sensors to detect the same site of the same sample at the same time, Professor Yin Liping of Capital Normal University elaborated this dual-sensor detection method in his article ^[2].

The common feature of the two types of dual-sensor detection is that they both use multiple sensors to detect the same sample at the same time. The difference is that the latter can detect the same site, while the former cannot achieve it. Therefore, the latter is also known as multi-sensor detection at the same site. The dual-sensor detection of the NMT system used in the above article belongs to this category.

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*Corresponding author E-mail: xuyue_weiwei@126.com

Tel: 18501056730

III. Function

In order to realize the multi-sensor detection function, the NMT system must have multiple channels. However, it is impossible to realize the multi-sensor detection function by only having 3 channels, 8 channels or multiple channels. To achieve this function, the problem of multi-sensor array and multi-signal acquisition must be solved. It is understood that at present, relevant technical problems have been solved, and there are patents related to multi-channel or multi-sensor detection [3].

In order to realize the multi-sensor detection function at the same location, the NMT system should not only have multiple channels, but also solve the problem of multiple sensor arrangement and multiple signal acquisition, but also break through a technical problem, that is, how to locate multiple sensors at the same location. According to the certification standards [4] issued by the Zhongguancun NMT Industry Alliance and the relevant funds, the products on the market can only achieve the same-point dual-sensor detection, and the same-point multi-sensor detection is still in further development.

IV. Function selection

Teachers should pay attention to the following aspects when selecting the multi-sensor detection function of NMT system:

1. When selecting the multi-sensor detection function, be sure to check with the merchant and indicate in the function parameters the number of sensors to be detected at the same time, not the number of channels. For example, three sensors are required to detect at the same time instead of three channels.
2. If you want to repeat Professor Wang Guangce's experiment, you must select the function of "same-point dual-sensor detection". Multi-sensor detection cannot achieve this function.
3. Select products certified by Zhongguancun NMT Industry Alliance.

Reference material:

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