



## Commercialization of fNIRS equipment at affordable price

### World's first measurement of entire cephalic region by fiber-less<sup>\*1</sup> technology

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Spectratech, Inc.

Spectratech, Inc. (Mitsuo Ohashi, President) successfully developed the small-sized functional NIRS equipment<sup>\*2</sup> (called as fNIRS equipment here after) utilizing the fiber-less<sup>\*1</sup> technology, which measures the entire cephalic region adopting the ultrasensitive APD (Avalanche photodiode) for its photo detector first in the world. Spectratech will commercialize Spectratech OEG-APD Series utilizing this technology. The Series has also adopted a pallet modular structure for its sensor assembly based on the new design concept. The new pallet module is designed to cover the cephalic region in segments, that is, it can measure expansively from frontal region, temporal region, parietal region, and occipital region to the entire cephalic region. Spectratech will start to receive the orders for OEG-17APD from this May at the first phase, which has an expandability of the measurement points of cerebral blood flow from the minimum 17CH to 37 CH, and 54CH.

Many of the brain researchers have utilized fNIRS technology by which a change in cerebral blood flow<sup>\*3</sup> is measured using near-infrared light since it can visualize the cerebral active state. In Japan, "The differential diagnosis support of depressive symptoms using optical topography scan" became to be covered by the health insurance in this April, which may mean that the fundamental brain science has become to be acknowledged also in clinical practice.

Spectratech has so far provided the researchers with the small-sized and low-cost Spectratech OEG-16 Series dedicated for measuring the frontal lobe. Many researchers in brain science have supported OEG-16 Series which has the high performance and reproducibility despite its low price.

Nowadays, we have received the requests from many researchers in brain science that they would like to measure the entire cephalic region. On the other hand, there has been a strongly-rooted request for the high-sensitive fNIRS equipment limited to the specific regions such as motor area and language area, etc. To respond to these requests, OEG-APD Series was developed to measure the entire cephalic region as well as achieving the dramatically high sensitivity by adopting APD.

The entire cephalic measurement type fNIRS equipments having been marketed so far are to measure with many photo detectors (palm size each) by guiding the lights to the main equipment unit through the optical fibers which are mounted on cephalic regions of interest. Therefore, the equipment configuration has to grow in size and to be expensive (about hundreds of thousands of dollars), which has posed an obstacle to its spread.

Spectratech has focused thoroughly on miniaturizing the photo detecting part and its high sensitivity, and has pushed forward the basic development for these several years. As the result, an ITO (Indium Tin Oxide) film was adopted for the photo detection window part of fNIRS as the transparent conductive film first in the world not only for enhancing the detection sensitivity but also for preventing external noises

from entering the photo detector. The ITO shielding technology uniquely developed by us has made it possible to house it in a photo detection unit as small as the little finger's tip at a markedly low noise level while an ultrasensitive characteristic is shown. Also, it can maintain the contact with head stably, and the issue of sensitivity reduction due to hairs is eased. The main equipment unit is as small as about a small laptop, it is easy to carry the equipment anywhere for measuring brain functions. Since it can measure at optional places such as rehabilitation center, institution for the aged, inside a car, movie theater, and in the woods, etc., it may increase the number and attributes of subjects, etc. remarkably.

It has of course realized the high-accuracy multichannel fNIRS with little coherence by our unique spread spectrum light modulation technology, which has been established since the launch of OEG-16 Series.

OEG-17APD to be released at the first phase will be priced at 4,500,000 yen (US\$45,000.00) in its minimum configuration.

In addition, this product is for the front-line brain researches, not for the purpose of specific diagnoses or medical treatments.

Recently, fNIRS equipments have become to be used for various research purposes such as psychology, pedagogy, linguistics, health science, nursing care, sports, and BCI (Brain Computer Interface), etc. beyond the medical front, getting a lot of attention. OEG-APD Series has been developed for being useful for those researchers in such a variety of the fields.

**\*1 fiber-less:** Use of copper wire instead of expensive optical fiber

**\*2 functional NIRS equipment:** Measuring equipment of cerebral blood flow using near-infrared light has been called optical topography, function testing oxymeter, or optical imaging brain-function measuring equipment, etc. However, it is expected to be unified into the name of "functional NIRS equipment" from now on.

**\*3 Change in cerebral blood flow:** In general, it means the change in concentration of oxyhaemoglobin and deoxyhaemoglobin which are measured in a local brain, and it has become to be called "PATHLENGTH DEPENDENT HAEMOGLOBIN CHANGE" in the academic community, etc. recently.

**Note:** OEG-APD Series will be sold only for the domestic market for the time being.

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Spectratech OEG-17APD main equipment unit



(External dimensions: 250(W) x 220(D) x 50(H) mm Weight: 2.2Kg)

Example of mounting on temporal region



Example of mounting on parietal region



Example of mounting on frontal region



Example of mounting on occipital region

