Title: Continuous monitoring of cell activity and culture conditions during cultivation using microplate reader with SOT spatial filter

Yuta Nakashima[1], Masaki Kounoura[1], Nao Watanabe[2], Sae Iwata[2], Syota Tsuru[2], Junfeng Zhu[2], Keisuke Nakakubo[2], Hiroyuki Ohashi[3], Kinichi Morita[3], Hiroaki Yoshioka[2], Yuji Oki[2], Satoru Kuhara[2], Kosuke Tashiro[2], Yoshitaka Nakanishi[1]

[1]Kumamoto University, Kumamoto, Japan
[2]Kyushu University, Fukuoka, Japan
[3]Ushio INC., Tokyo, Japan

Keywords: Real time monitoring, Silicone optical technology, Plate reader, Cell activity

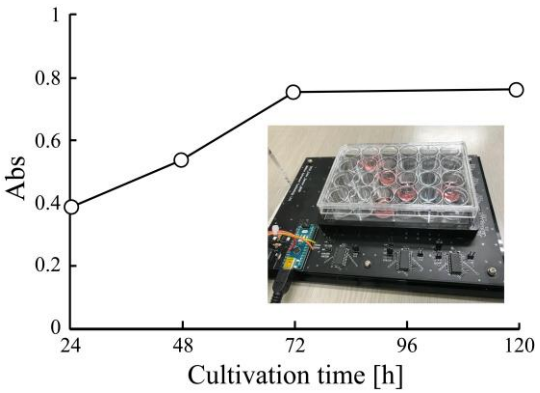
I. Abstract Body (up to 250 words)

This paper presents that a 24 channel plate reader for continuous monitoring the cultured cell in real time. Continuous monitoring of the cell is very important for maintaining and controlling the cell multiplication and the cell differentiation. The fabricated 24 channel plate reader permits the real time cell monitoring during cultivation in the clean bench and cell culture condition.

The presented 24 channel plate reader is consisted of a silicone optical technology (SOT) spatial filter, LED light source, and color sensors, and realized miniaturization of the almost same size as the cell culture microwell plate. We proposed SOT which can obtain excellent noise reduction effect, recently [1]. Because the light reflection at the optical path interface can be absorbed and the only straight forward light can be transmitted, it is possible to expect a larger S/N ratio compared with the conventional optical system. The SOT consists of a transparent PDMS in the optical path and a PDMS in which microsized carbon is dispersed in the light guide. We fabricated a spatial filter with SOT structure and confirmed the light absorption performance based on the presence or absence of light shielding against external light. As a result, the difference was 0.02%. By using this spatial filter, it is possible to manufacture a device which does not consider the influence of external light [2].

As a results of cell activity assay using fabricated 24 channel plate reader, cell activity that increase with time passage was successfully evaluated by the presented system.

II. Image:



III. Reference:

1 Nomada, H., Morita, K., Higuchi, H., Yoshioka, H., Oki, Y., 2017. Carbon-polydimethylsiloxane-based integratable optical technology for spectroscopic analysis. Talanta, 166; 428-432

2. Nakakubo, K., Jun Feng, Z., Nomada, H., Morita, K., Yoshioka, H., Oki, Y., 2017. 3D-printed lens molds by gallium surface control for on-demand fabrication of optical sensing system. ICFIA, P-21

IV. Biography:

Yuta Nakashima, Associate Professor in Faculty of Advanced Science and Technology, Kumamoto University, Japan. He received the PhD degree in 2007. In 2013, he joined the Kumamoto University as an assistant professor, and is currently an associate professor. His research interests include real-time cellular sensing, cell differentiation, cell biomechanics, cancer diagnostics, etc, using MEMS technology.

V. Presenting author details



Full Name: Yuta Nakashima
Contact number: +81-96-342-3743
Session name/ number: Bioengineering Application/ 7
Category: Poster presentation