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ASIA EDITION

Hamamatsu Photonics develops novel 3D fluorescence scanner

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CYTOQUBETM (Light-Sheet Microplate Cytometer) Prototype equipped with Zyncscan technology to perform an X-Z Plane Scanning Method



Hamamatsu Photonics K.K. has developed a novel 3D fluorescence scanning method called “Zyncscan™” that performs x-z plane scans using a light-sheet for cell-based fluorescence assays in microplates. This technology provides an x-z plane scan using a light-sheet for a whole 96/384/1536-well microplate, allowing users to obtain 3D fluorescence images of whole wells in xy: 2-3?m and z: 6-7?m voxel resolution for ? 300?m thickness from the well bottom within a few minutes per colour. This technology also allows for ultra-high level separation of cell fluorescence signals from the background, which makes it possible to obtain fluorescence cell images in the cell culture mediums containing serum and with fluorescent dyes (i.e., no need to wash out fluorescent dyes).

Drug discovery and development requires physiologically-relevant *in vitro* cell culture models like primary cells, patient-derived cells, human iPSC-derived disease-modelling cells, co-cultures of different types of cells, and 3D cultures such as spheroids and organoids. This novel instruments facilitating high-throughput fluorescence imaging and measurement of heterogeneous 2D and 3D cell cultures, assists in developing advanced phenotypic assays and screenings using these physiologically-relevant cellular models. Zyncscan^{TM} technology performs an x-z plane scan utilizing a light-sheet for a microplate to meet these needs.

Features of the cell-based fluorescence assays in microplate using Zyncscan™ technology

- **High-speed fluorescence cytometry for 2D monolayer heterogeneous cell culture**

A single 120-second scan (one colour) for a whole 96/384/1536-well microplate enables fluorescence cytometry of all individual cells in all wells.

- **Single spheroid analyses using depth information (diameter of spheroid; ? 200?m)**

A single scan (in just a few minutes) for a microplate enables fluorescence images of spheroids (single or multiple spheroids in a well) in all wells in a 96/384/1536-well microplate. From the images, the entire fluorescence intensity,

thickness and volume of each individual spheroid are estimated.

- **Fluorescence images in 3D view (? 300?m)**

With a single scan (a few minutes) obtain 3D fluorescence images (300?m from the bottom of a well) of all wells in a plate. The optical resolution of the image is comparable with the 2x objective of a conventional fluorescence microscope in the x- and y-axes and a 10x objective of confocal fluorescence microscope in the z-axis.

- **In-medium / No dye washout measurement**

Measure cellular fluorescence in the medium containing serum and with fluorescent dyes (no need to wash out fluorescent dyes), allowing cells to remain healthy throughout the experiment.

Hamamatsu Photonics K.K. has been developing a fluorescence instrument for cell-based assays equipped with Zyncscan™ technology, CYTOQUBE™, a Light-Sheet Microplate Cytometer. The company plans to initiate validation and application experiments in several research sites in drug discovery and development by early 2020. CYTOQUBE™ is planned to be released by the end of the next fiscal year (September 2020). The prototype of the CYTOQUBE™ (Light-Sheet Microplate Cytometer) will be showcased at the conferences at the US and Canada in June 2019.