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Launch of the MirrorCLEM System for Correlative Light and Electron Microscopy

-New system simplifies correlative imaging of one location
with both light and scanning electron microscopes-

TOKYO, Japan, July 21, 2016 – Hitachi High-Technologies Corporation (TSE: 8036, Hitachi High-Tech) and RIKEN, one of Japan's national institutes for scientific research, announced today that they have jointly developed "MirrorCLEM," a system for simplifying correlative light and electron microscopy (CLEM) which enables the observation of one using both light and scanning electron microscopes (SEM). This new system will be launched for sale by Hitachi High-Tech on 25 July, 2016.

Various types of microscopes are used in a wide variety of fields such as nanotechnology, materials, medical and life sciences. In the medical and life sciences field in particular, SEMs are used to clarify the ultrastructure of cells and tissues, while a type of light microscope called fluorescence microscopes are being used increasingly to observe the localization and behavior of proteins at the molecular level. In recent years, CLEM techniques, which correlate electron microscopy with fluorescence microscopy, have been developed. However, the observation of the same field in a specimen with microscopes at different magnifications and observation characteristics remained a difficult task.

To solve this problem, in 2015 Hitachi High-Tech worked with a group led by Dr. Kiminori Toyooka, a senior research scientist with the RIKEN Center for Sustainable Resource Science, to research and develop a system for observing the ultrastructure of organelles*1 containing green fluorescent proteins (GFP)*2. RIKEN developed the microscopic observation workflow and the preparation method of embedding in resin to preserve both the GFP fluorescence and ultrastructure. Meanwhile, Hitachi High-Tech developed a dedicated jig for observing plastic sections mounted on cover slips under a Field-Emission SEM (FE-SEM), as well as the software for swiftly and accurately observing the same location of florescence microscopy in a FE-SEM.

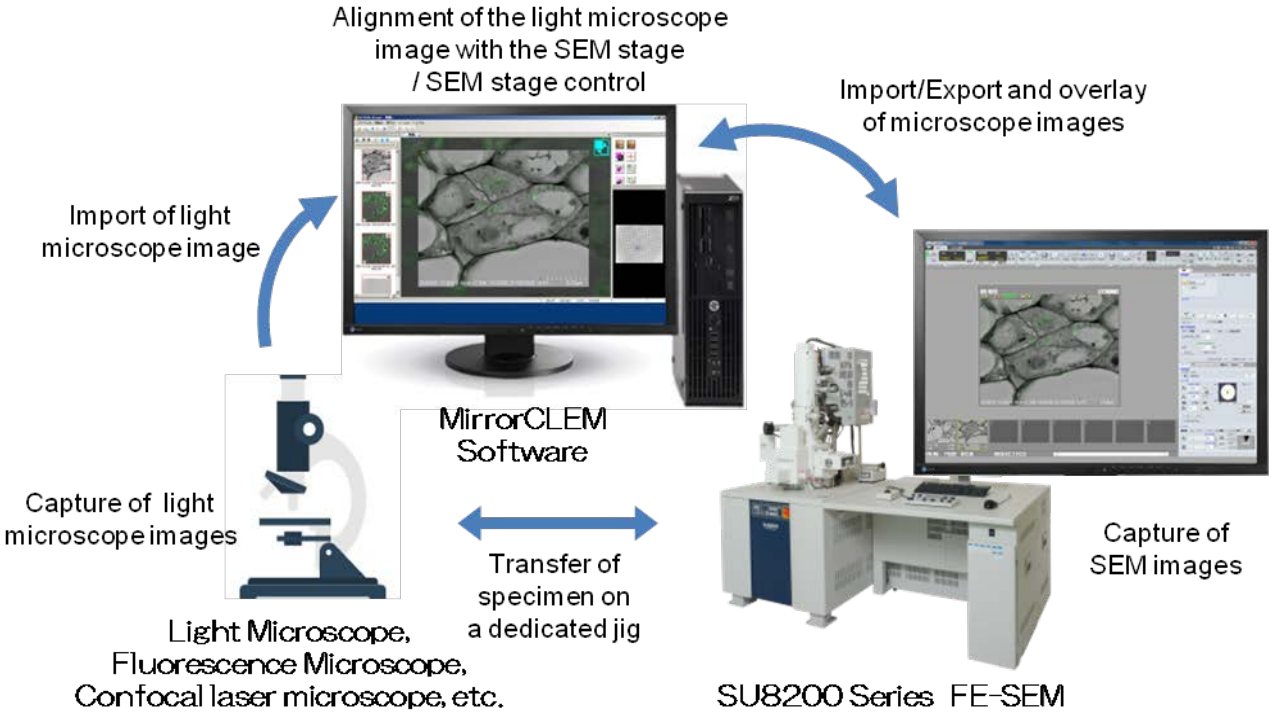
The "MirrorCLEM" system that Hitachi High-Tech and RIKEN subsequently developed supports quick and accurate CLEM analysis by using a FE-SEM. With this system, the plastic sections can be observed under a light microscope from low magnifications to magnifications that are high enough to clearly observe the structure of interest. In addition, the FE-SEM stage can be

coordinated to the target position in the low-magnification (LM) image which is observed with the light microscope. Subsequently the field of view (FOV) in a FE-SEM can move to any region of interest in the LM image and the same FOV can be observed in the FE-SEM under the “MirrorCLEM” system. Also, the system is capable of displaying an overlay of the light microscope and FE-SEM images in real time. The Hitachi SU8220 FE-SEM equipped with the “MirrorCLEM” system has already been used to clarify the ultrastructure of peroxisomes containing GFP in the cotyledon and root in transgenic *Arabidopsis thaliana*.

Hitachi High-Tech will launch “MirrorCLEM” as a CLEM system option for the SU8200 series of FE-SEMs, with sales projected at 50 sets per year. Moving forward, this will maximize and enhance FE-SEM capabilities, and can be interfaced with numerous microscopes, to contribute to the advancement of CLEM analysis in a variety of fields including medical and life sciences.

1. Organelle: A term of specialized structure within the cell that has specialized function
2. Green fluorescent protein: A fluorescent protein that emits a green light when irradiated with excitation light of appropriate wavelengths

<Overview of the MirrorCLEM System>



About Hitachi High-Technologies Corporation

Hitachi High-Technologies Corporation, headquartered in Tokyo, Japan, is engaged in activities in a broad range of fields, including Science & Medical Systems, Electronic Device Systems, Industrial Systems, and Advanced Industrial Products. The company's consolidated sales for FY 2015 were approx. ¥629 billion [USD5.8 billion].
For further information, visit http://www.hitachi-hightech.com/global/.

About RIKEN

RIKEN is Japan's largest research institute for basic and applied research. Over 2500 papers by RIKEN researchers are published every year in leading scientific and technology journals covering a broad spectrum of disciplines including physics, chemistry, biology, engineering, and medical science. RIKEN's research environment and strong emphasis on interdisciplinary collaboration and globalization has earned a worldwide reputation for scientific excellence.
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