

# News Release

## **Field Emission Electron Microscope Selected for Inclusion on a List of the “100 Innovations in Postwar Japan”**

Tokyo Japan, August 1, 2014 – Hitachi High-Technologies Corporation (TOKYO: 8036; Hitachi High-Tech) today announced that its Field Emission Electron Microscope was selected as one of the “&100 Innovations in Postwar Japan” by the Japan Institute of Invention and Innovation (JIII), which formulated the list as part of celebrating its 110th anniversary as an independent entity.

“Top 100 Innovations in Postwar Japan” is a list of innovations that contributed greatly to industrial and economic growth in postwar Japan. At the first announcement of the list on July 8, 2014, JIII named Hitachi High-Tech’s Field Emission Electron Microscope as one of the 38 noteworthy innovations in Japan from the postwar-recovery through to the high-economic-growth period.

In 1968, Hitachi, Ltd. (Hitachi) created a practical field emission (FE) electron beam source together with the late Dr. Albert V. Crewe (former University of Chicago professor), the original developer. Subsequently in 1972, Hitachi installed the FE electron beam source in a scanning electron microscope (SEM), marking the successful development of the HFS-2 model, the world’s first commercial FE-SEM\*. The HFS-2 model could be easily operated to observe stable and reliable ultra-high resolution images. Efforts to shore up and automate the technology resulted in the launch of the S-800 model in 1982, which significantly improved the operability of FE-SEMs and contributed to their prevalence. The technology was also applied to help advance the miniaturization of semiconductor devices when Hitachi launched the S-6000 critical dimension (CD) SEM in 1984 for controlling pattern widths in the lithography and etching process of semiconductor manufacturing lines. Shortly thereafter, in 1985, Hitachi’s FE-SEM was used to achieve the world’s first SEM image observation of the AIDs virus. In these and other ways, the FE-SEM has contributed not only to the development of nanotechnologies such as catalysts, electrode materials for batteries, and nanotubes, but also to major advancements in the healthcare and biotechnology fields.

Hitachi High-Tech was formed through the merger in 2001 of Nissei Sangyo Co., Ltd., a Hitachi Group trading company specializing in technology, and the Instruments Group and Semiconductor Manufacturing Equipment Group of Hitachi. The Hitachi High-Tech Group is currently responsible for electron microscope manufacturing, sales and services.

Looking ahead, Hitachi High-Tech will continue to develop outstanding proprietary technologies and products in fields including FE-SEM, where it was selected to the list of “Top 100 Innovations in Postwar Japan,” with the view to contributing to the realization of a safe, secure and comfortable society and the advancement of industry worldwide.

### **FE-SEM Award History**

- 1976: Received the Okochi Memorial Foundation Technology Award for the development of a high-resolution FE electron microscope
- 1995: Received a R&D 100 Award for the “Miracle Eye” HM-2000 200kV FE-SEM from R&D Magazine (U.S.)
- 2008: Received the 54th Okochi Memorial Foundation Manufacturing Award for the development and commercialization of a CD-SEM for measuring ultrafine semiconductor patterns.
- 2012: Received an IEEE Milestone for developing the world’s first practical FE-SEM.

\*FE-SEM (Field Emission-Scanning Electron Microscope): Refers to an SEM that enables ultra-high resolution observation through a built-in FE electron beam source, which provides a smaller wave dispersion and higher intensity than electron beam sources (thermal electron sources) used in conventional SEMs.

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