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Hitachi High-Tech Launches the Easy-to-Use AFM100 and AFM100 Plus Atomic Force Microscopes

Increased Total Throughput and Improved Reliability

Tokyo, June 17, 2021 – Hitachi High-Tech Corporation (President and CEO: Takashi Iizumi / Hitachi High-Tech) announced the launch of both AFM100 and AFM100 Plus systems – entry-level and intermediate-level models of Hitachi's compact and versatile Atomic Force Microscopes (AFM). These tools are designed to offer ease of use and superior reliability for high-throughput R&D or quality control applications.

【AFM100 Plus】

The AFM is a type of the Scanning Probe Microscope (SPM) that scan the surface of a sample using a sharp tip typically with a radius of a few nanometers (1 nanometer = 1/1,000,000 millimeter). The AFM can provide both high-resolution visualization of surface morphology and simultaneous mapping of various other physical properties at the nanoscale. Therefore, the AFM is intensively used for scientific research and development, as well as quality control across a wide range of industrial fields, such as examining battery materials, semiconductors, polymers, living organisms, etc.

Conventional AFM operation could be quite time consuming and demanding. The workflow contains some mandatory steps such as loading a tiny cantilever (approximately 1 mm wide) manually with a tweezer to the target location, determining the right interaction force between the tip and the sample as well as adjusting the scan speed, all of which may involve back and forth trials. As a result, the overall throughput from the start of tool setup to the end of data acquisition was relatively low. In addition, both quality and reliability of acquired AFM data can vary significantly from person to person since selecting an appropriate type of cantilevers and optimizing an array of

imaging parameters are highly dependent on operator's experience and skill levels. The AFM100 and AFM100 Plus developed by Hitachi High-Tech address these issues and aim to increase the expansion of AFM technology in industrial, scientific, and research and development fields. Both the AFM100 and AFM100 Plus render extreme ease of use and ensure operator-to-operator consistency. Particularly, the AFM100 Plus can be utilized in a wide variety of applications, including high-resolution imaging of nanomaterials such as graphene and carbon nanofibers, 3D shape observation over wide areas exceeding 0.1 mm, roughness analysis, and physical property evaluations.

The key benefits of these products are as follows:

1. Improved usability, reliability, and total throughput

To make the cantilever loading/unloading much easier, a newly developed premounted cantilever[*1] has been adopted and it can significantly improve the usability. In addition, these instruments come with an autopilot function that automatically optimizes measurement parameters, controls the interaction force between the tip and the sample, and adjusts the scan speed, thus reducing human errors. Therefore, reliable and consistent data acquisition can be readily realized. The system also supports multi-point measurement with a recipe, which enables automated data collection and storage throughout the entire measurement process just by a single click, thus the total throughput can be dramatically increased.

2. Enhanced correlation with Hitachi High-Tech's SEM

The optional AFM marking function uses Hitachi High-Tech's originally developed SÆMic solution. SÆMic (Scanning Atomic and Electron Microscopy) is a correlated imaging technique that improves compatibility between AFM and Scanning Electron Microscopes (SEM). Specifically, both the AFM and SEM can be used to examine the sample at the same locations, which enables a cross-platform, multifaceted analytical approach to achieve comprehensive characterizations of mechanical, electrical, and compositional properties of the sample.

3. Scalable and durable

The system comes with the lifetime free download of new control software and a self-checking function that can automatically diagnose the root cause of malfunctions as standard, contributing to long service life for users. This allows users to keep their equipment up-to-date and performing at its highest level.

Hitachi High-Tech is committed to developing innovative solutions such as these AFM products, creating social and environmental values together with our customers, as well as contributing to cutting-edge manufacturing.

*1 Premounted cantilever: This method uses a cassette chip with a pre-installed cantilever for lever mounting.

■ About AFM100 Plus

Feature	AFM100 Plus
Detection system	Optical lever method SLD (super luminescent diode)
Sample size	Up to φ35 mm, 10 mm thick (with optional extensions: up to 50 mm × 50 mm, 20 mm thick)
Scanning range	All selectable options (XY/Z): 20/1.5, 100/15, 150/5 (unit: μm)

■ Website for AFM100 Plus/AFM100

https://www.hitachi-hightech.com/jp/science/products/microscopes/afm/unit/afm100.html

■ Contact

Electron Microscopes / Atomic force Microscopes Contact

https://www.hitachi-hightech.com/global/science/maintenance/inquiry.html

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