

## Nano 3D Measurements of Ultra-smooth and High-performance Polyester Films Using AFM and CSI

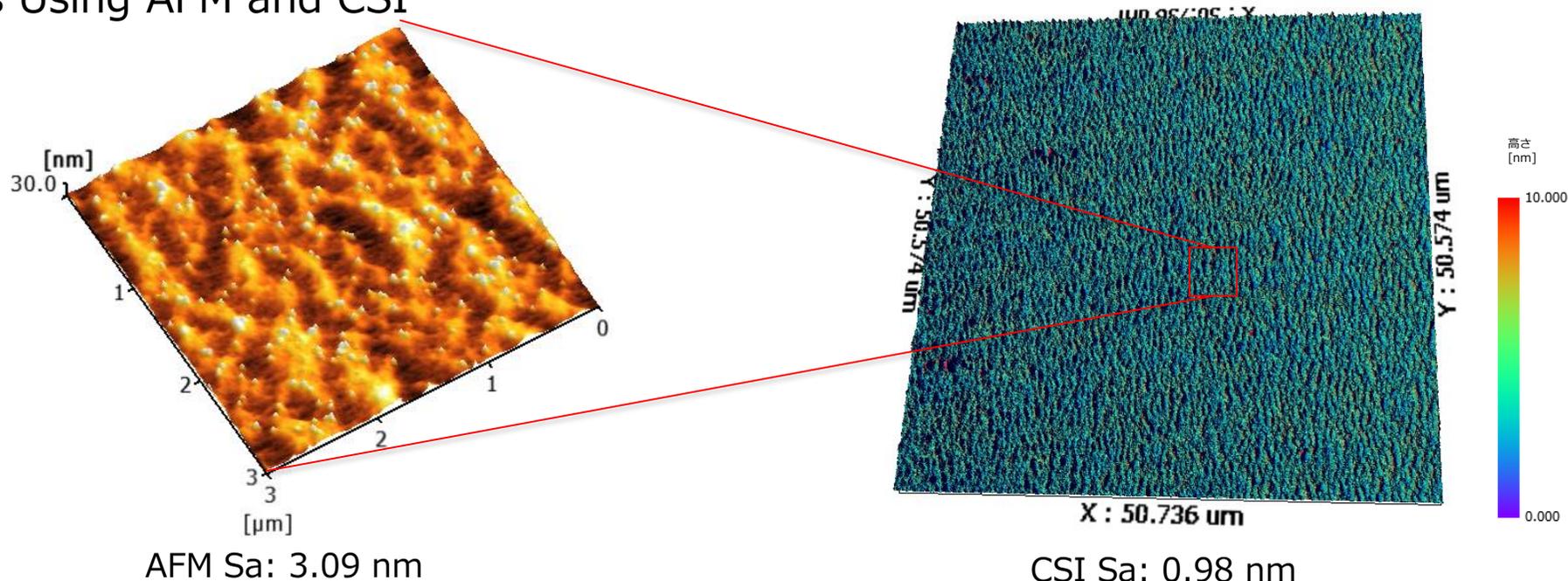


Fig.1. Localized AFM topography image (left) and large-area CSI image (right) of a highly smooth polyester film using the AFM5500M and VS1800.

When selecting the right instrument for an application, whether it is for quality control, material development, or failure analysis, factors such as the nature of samples, measurement objectives, and performance and capabilities of each tool are generally considered in order to achieve more efficient and accurate analysis. In this application brief, both atomic force microscopy (AFM) and coherence scanning interferometry (CSI, a nano 3D optical interference profiler) are demonstrated to render nanoscale 3D analysis ranging from an extremely small area to a wide area.

Fig. 1 shows the topography images and the measured surface roughness  $S_a$  (arithmetical mean height) of a high-performance and ultra-smooth polyester film (PET film) obtained by using AFM and CSI.

AFM is well known for extremely high-resolution imaging in both vertical and horizontal directions, and can disclose particle dispersion and particle size. Observation and measurement of sub-nanometer surface roughness can be achieved readily by using AFM. From the AFM image with a scan size of 3  $\mu\text{m}$  in Fig. 1, fine particles with a diameter of about 30 nm and their distribution on surface were clearly resolved.

On the other hand, CSI can measure a much wider area ranging from 43  $\mu\text{m}$  to 6.4 mm in a few seconds per shot. The vertical resolution of CSI is comparable to that of AFM, and the wave mode used for this measurement has a resolution at an angstrom level. Therefore, it is suitable for quick measurement of surface textures and surface swells in a wide range. When needed, AFM can be used for extremely high-resolution measurements. In this case, the combined AFM /CSI image enables the measurement of the roughness due to the characteristic shape of streaks found on the PET film surface.

\*CSI: Coherence Scanning Interferometry

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## Nanomaterial

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推奨構成	備考
AFM AFM5500M	
<ul style="list-style-type: none"> <li>• Cantilever: SI-DF3P2</li> </ul>	
CSI VS1800	
<ul style="list-style-type: none"> <li>• 110 x Two beam interference objective lens</li> </ul>	



AFM5500M



VS1800