Ebatco Nano
A Bimonthly Newsletter

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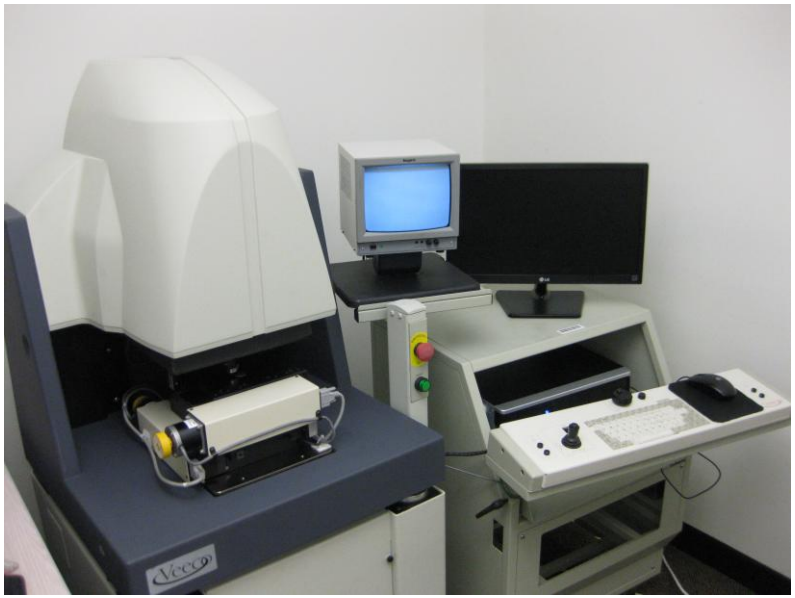
Nano Brief

Mark your calendar! We are enthusiastically preparing for our second Open House scheduled on June 24th to appreciate our loyal customers and inspiring and supportive friends, and to welcome our new and prospective customers. In addition to meeting and greeting, showcasing our nanotech-intensive facilities, food and drinks, a raffle drawing with the grand prize of a quadcopter is planned to surprise the lucky winner. Please remember to bring your business card to participate the raffle drawing!

Ebatco

To facilitate communications with our customers, Ebatco has just added a toll-free phone line.
It is relative easy to remember: 1-844-3Ebatco or 1-844-3322-826. We are looking forward to hearing from you soon!

The NAT Lab's new tool addition, the Wyko NT3300 Optical Profiler, grants extended surface profiling capabilities to help support the testing needs of our customers. The NT3300 measures a surface profile by means of white light interferometry instead of a contact stylus. This non-contact profiling capability prevents possible surface contamination and damage to a material's surface and is ideal for delicate samples such as MEMS devices and soft materials. The NT3300 has two measurement modes, phase-shift interferometry (PSI) and vertical-scanning interferometry (VSI). The PSI mode is perfect for continuous surfaces with surface roughness and step height changes in nanometers. On the other hand, the VSI mode can determine a surface profile with feature heights in millimeters. The NT3300 can also utilize the stitching function to perform multiple measurements over large areas and compile them into one seamless image.

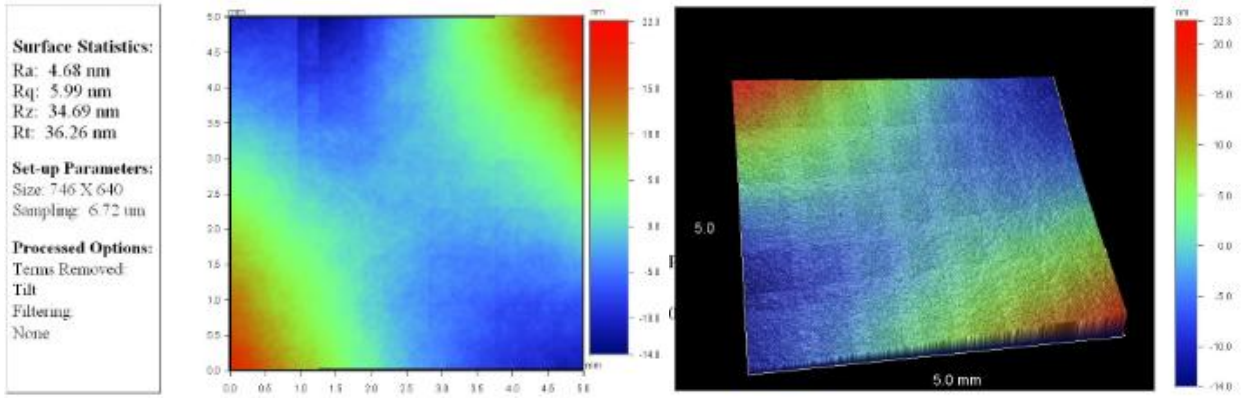


The Wyko NT3300 Optical Profiler

Case Study

Nanoscale features are of paramount importance in microelectronics and semiconductor industry. To ensure the quality of the nanoscale features fabricated, wafers must be planarized and polished to achieve minimal surface roughness before and after coating applications. However, wafer coatings could have defects such as bumps, coating degradation, chipping, creases, dimples, particle contaminants, scratches, voids, etc. These coating defects can affect the fabrication of integrated circuits, lead to final devices not meeting specs or having premature mechanical failure. Surface coating defect inspection, identification, and classification thus are of great significance for improvement on quality, increase in yields and reduction in costs.

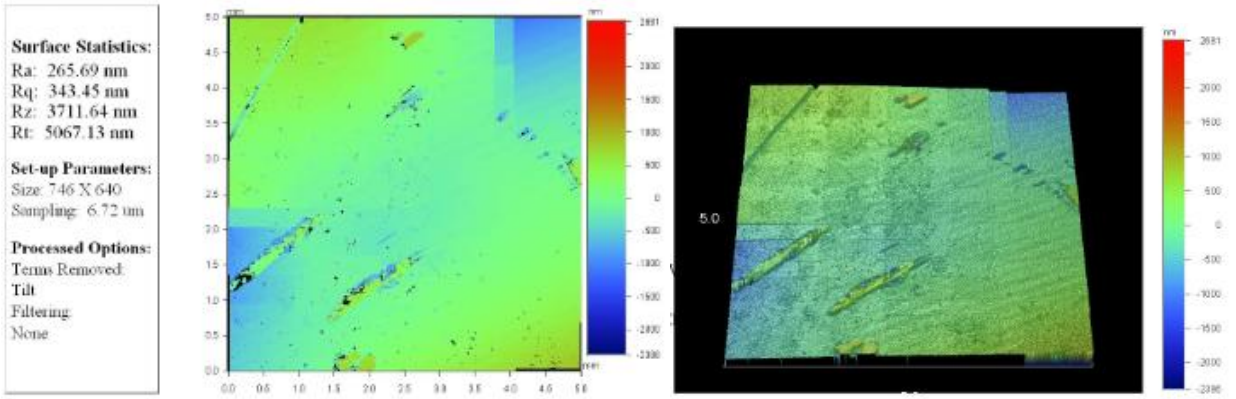
Optical profilometry is one of the top choices for coating inspection at the nano and micro scale for the microelectronics industry. The Wyko NT3300 Optical Profiler equipped at Ebatco's Nano Analytical and Testing Laboratory (NAT Lab) uses both vertical scanning interferometry and phase shift interferometry to characterize surface features. Sub-nanometer resolution in phase shift interferometry allows for precise surface feature and roughness analysis of smooth surfaces, while vertical scanning interferometry permits millimeter-sized object profiling and contouring. An obvious advantage of non-contact profilometry is its ability to make non-destructive and rapid analyses on specimen surfaces in contrast to contact based stylus measurements that are slow and that have to be in contact with the analysis surface.



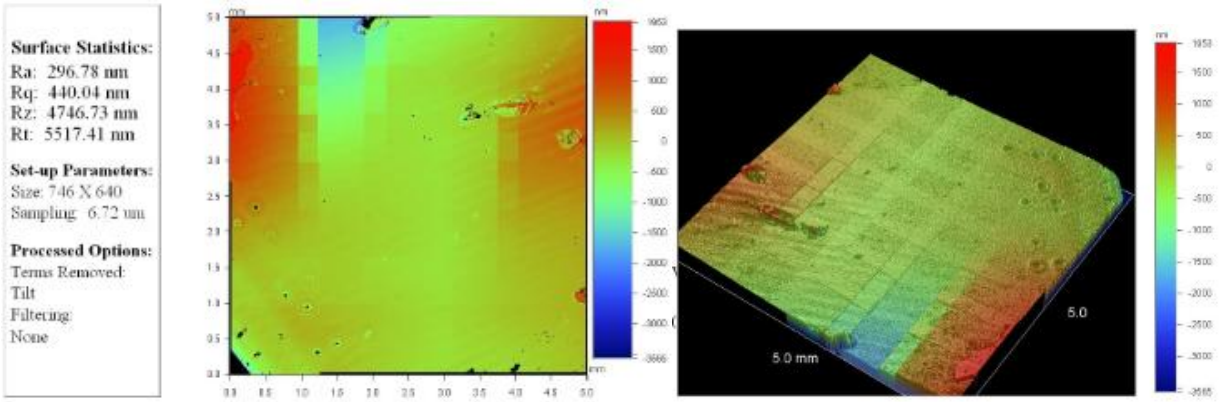
Optical profile (left) and 3D image (right) of a coated wafer area without defect.

Presented here are optical profiling images of a coated wafer surface at different locations. The left images show 2D profiles with surface roughness parameters of Ra, Rq, Rz, and Rt. The images on the right show 3D visualization of the specimen surfaces. As can be seen from these images the stitching function of the profilometer has made possible to cover large areas with high resolutions by stitching together multiple smaller scans.

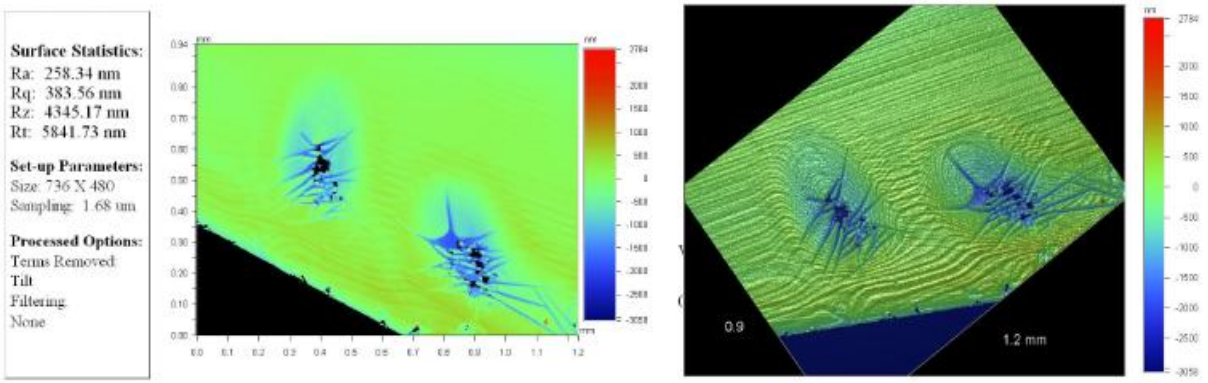
In the above figure, the 2D analysis and 3D rendering clearly shows a smooth and defect-free surface with roughness in the single digit nanometers. In contrast, the figures below present the 2D and 3D characteristics of coating defects: scratches, pits, cracks and areas where there are raised features, possibly indicating residues or buildups on the coating surface.



Optical profile (left) and 3D image (right) of a coated wafer area with scratches, residues and buildups.



Optical profile (left) and 3D image (right) of a coated wafer area with pits.



Optical profile (left) and 3D image (right) of a coated wafer area with cracks.

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