

Advanced 3D Films Analysis

FULL AREA TOPOGRAPHY AND THICKNESS OF SUB-MICRON FILMS

Precise deposition and process control of thin, transparent films are critical across a variety of market applications, including consumer electronics, semiconductor and optics. ZYGO's proprietary films analysis, based on Model Based Analysis (MBA) – enables quantitative 3D surface measurement and analysis of film structure and topography of thin optical films.

Using Coherence Scanning Interferometry (CSI), such as a ZYGO Nexview™ optical profiler with MX™ analysis software, the user simply defines a nominal film stack. Materials for the film and the substrate are selected from a library of known materials, or by directly entering the index of refraction (n and k). The range of potential film thickness is also defined. Based on this input, the software generates a library of possible signals and then compares these to measured signals over the full field of view. This produces a 3D map of thickness, along with surface maps for the top of the film and the substrate.

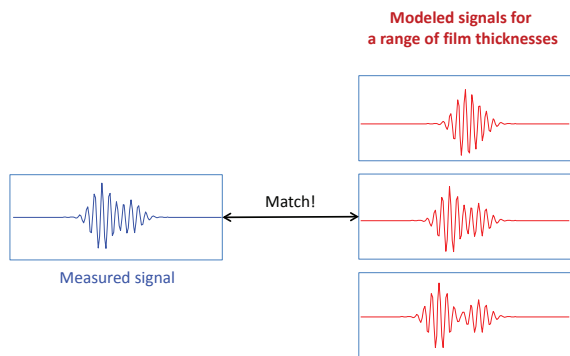


Figure 1 – The MBA solution uses a library search to compare the measured signal to modeled signals for a film stack. This allows for precise profiling of otherwise impossible to measure surfaces using CSI. The above example shows a film signal being compared to a range of signals in the model library.

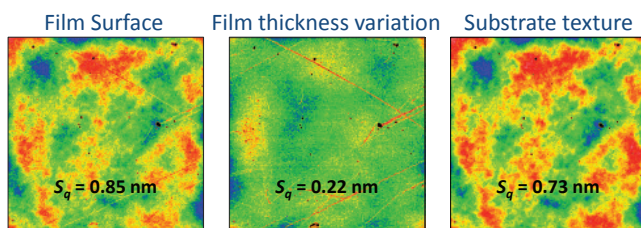


Figure 2 – Film Surface, thickness variation, and substrate texture illustrate how the MBA technique can isolate substrate features from film topography features.

Features of the Model Based Analysis measurement mode include:

- Full area metrology for films as low as 50 nm thick
- “Through the lens” operation using the standard field of view of the profiler uses no external or additional sensors
- Simultaneously measure film topography, film thickness, and substrate topography
- Accurate height measurements of dissimilar materials by correcting for the “Phase Change on Reflection” (PCOR) phenomenon
- Works across the complete range of objective and zoom magnifications
- Requires only a simple optical flat for calibration

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