Capacitance Calibration Standard for AFM-Based Scanning Microwave Microscopy

Agilent Technologies introduced the first commercially available capacitance calibration standard for an atomic force microscope. The scientific solutions provider issued calibration specifications for capacitance measurements that allow quantitative assessment of material and device properties via its award-winning Scanning Microwave Microscopy Mode. Researchers from Agilent collaborated with the National Institute of Standards and Technology (NIST Boulder Laboratories) to establish the new standard.

“SMM Mode is the only AFM-based electrical characterization technique that affords researchers true calibrated capacitance,” said Jeff Jones, operations manager for Agilent’s nanoinstrumentation facility in Chandler, Ariz. “This quantitative information is critical to better understand the response and behavior of nanoscale systems, especially when device properties have to be assessed at their intended operation frequencies.”

SMM Mode is a unique method that uses an Agilent microwave vector network analyzer in concert with an Agilent 5420 or 5600LS AFM to measure properties associated with small variations in the electromagnetic interactions of a sample’s components with the incident microwave signal, statically or dynamically. The Agilent-exclusive technique can be used for measurement on semiconductors (no oxide layer required), metals, dielectric materials, ferroelectric materials, insulators and biological materials. Data from representative samples demonstrate that SMM Mode is capable of mapping material properties at a resolution ultimately limited by the sharpness of the AFM probe.

Agilent’s SMM Mode was named an R&D 100 Award winner by an independent judging panel and the editors of R&D Magazine. It was also named a 2009 Prism Award winner by judges from SPIE and the advisory board of Laurin Publishing’s Photonics Spectra magazine.

A photo of the SMM Mode using the Agilent microwave vector network analyzer with an Agilent 5420 or 5600LS AFM is available at www.agilent.com/find/AFM_SMM_images [1].

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[1] http://www.agilent.com/find/AFM_SMM_images