

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Attofarad capacitance measurement on organic thin films using Scanning Microwave Microscopy SHIJIE WU, Agilent Technologies, Inc, JINGJIANG YU, Agilent Technologies, Inc. — Scanning microwave microscopy (SMM) is a recent development in SPM technique that combines the lateral resolution of AFM and the measurement precision of microwave analysis. It consists of an AFM interfaced with a vector network analyzer (VAN). In the reflection mode (S11 measurement), the measured complex reflection coefficient of the microwave from the contact point directly correlates to the impedance of the sample under test. The maximum sensitivity of the measurement is obtained at the resonance where the impedance of the sample under test matches the characteristic impedance. Since the measured load impedance is largely determined by the impedance of the sample under test, SMM can be used to measure the capacitances over dielectric thin films. In this presentation, we report the calibration of SMM using a capacitance standard developed by NIST. Then SMM is used to measure the minute capacitance difference between decanethiol and octadecanethiol SAM layers. The coexistence of two different SAMs on the same substrate with a well-known height difference of 0.88 nm is achieved via an AFM-based nanolithography method known as Nanografting. The measured capacitance difference is about 24 attofarads under the condition that the effective tip/sample contact area was estimated to be about 60nm in diameter.

Shijie Wu
Agilent Technologies, Inc

Date submitted: 10 Nov 2010

Electronic form version 1.4