Interfacial Force Microscope

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Interfacial Force Microscope (IFM)

Capable of measuring normal and lateral forces between a probe and sample. Functions much like an AFM or a nano-indenter.

A few features make it different:
- The force sensor has zero compliance (i.e. infinitely stiff), therefore loading is through a displacement-controlled process.
- The probe can (or has to) be made by users and mounted to the force sensor.
- The typical force sensor has a measuring range of 10 nN ~ 50 µN (resolution better than 1 nN), lying between conventional AFM and nano-indenter; displacement resolution better than 1 Å.
- Measurement environment (e.g. humidity) is potentially controllable.
IFM System

Controller

Computer

Head & sample stage
IFM Probes and Sensors

Force sensor:
A novel electrostatically-driven & self-balancing sensor, which **ALWAYS** maintains at the same position

ZERO instrument compliance
Unique Feature

Because of zero machine compliance, there is no "snap-in" or "snap-out" of contact when we perform force-distance measurements.

Typical Measurement of IFM

Probe: Spherical silica tip (a few hundred microns in radius) made by pulling borosilicate glass capillary tube under H$_2$ flame;

Substrate: Silica flat made by thermally oxidizing a silicon wafer.

$N_2$ environment with 20% relative humidity