

Surface Characterization Solutions for Semiconductor Applications

A Workshop on Solid Surface and Solid-Liquid Interface Analysis

May 1, 2024 | 9:30 AM – 4:00 PM

Venue

Covalent Metrology Lab
927 Thompson Pl, Sunnyvale, CA 94085

In this workshop, we focus on mechanical and chemical properties of material surfaces with relevance for semiconductor and related applications. The program comprises of an introductory seminar to gain insights into the analytical methods for measuring zeta potential (surface charge), hardness, elasticity, and adhesion, followed by a practical session using the corresponding instruments and dedicated samples.

The **zeta potential** is a fundamental characteristic of the solid-water interface. It represents surface and interfacial charge. Despite of a common theoretical background, the analytical methods for the zeta potential analyses differ significantly for particle dispersions (by electrophoretic light scattering) and solid material surfaces (by streaming potential).

The analysis of the surface zeta potential serves versatile applications. In this workshop, we focus on case studies relevant for semiconductor processing and related fields.

Nanoindentation is a surface characterization technique used for measuring the mechanical properties of materials such as hardness, modulus, viscoelasticity, creep, and fracture toughness. Nanoindentation, unlike conventional mechanical testing techniques, is particularly useful for characterizing the properties of complex materials such as composites, thin films and coatings, and soft materials such as hydrogels. In this workshop, we will focus on how nanoindentation can be applied to the semiconductor industry to evaluate coating deposition process, coating quality, bonding pads characterization, etc.

Scratch testing is another surface characterization technique used to evaluate the cohesive and adhesive properties of thin films to determine the failure points of the film-substrate system. Of particular significance to the semiconductor industry is controlling the adhesion among passivation layers, the underlying layer, and/or the semiconductor wafer to mitigate premature delamination and ultimate component failure. In this workshop, we will focus on how scratch testing can be employed for cohesion and adhesion testing of semiconductor materials.

Presenters

Thomas Luxbacher, PhD
Principal Scientist, Anton Paar GmbH

Parth Kotak, PhD
Applications Scientist, Anton Paar USA

Program

9:15 AM	Registration
9:45 AM	Welcome & Introductions
10:00 AM	Presentation 1: The complementarity of solid surface and liquid phase zeta potential: Focus on semiconductor applications <i>Thomas Luxbacher, PhD</i>
10:45 AM	Presentation 2: Nanoindentation and Nano scratch: Semiconductor applications <i>Parth Kotak, PhD</i>
11:30 AM	Covalent Overview: Complementary techniques for surface and interface characterization
12:00 PM	Lunch
1:00 PM	Begin Demo Sessions: Nanoindent, Nano-scratch, and Zeta Potential <i>Parth and Thomas</i>
4:00 PM	Workshop Ends