

Cowley Distinguished Lecture

Thursday, October 20, 2022

Refreshments at 3:45pm in PSF 186

Lecture from 4:00 PM – 5:00 PM in PSF 101

In-situ imaging and spectroscopy with few-eV electrons

Dr. Ruud Tromp

IBM



Abstract:

Low Energy Electron Microscopy (LEEM) and Photo Electron Emission Microscopy (PEEM) use low energy electrons, typically less than 100 eV, not only to image surfaces and interfaces with nanometer resolution, but also to characterize them with a range of spectroscopic methods. In this talk I will present a range of applications in which spectroscopy plays a central role. This includes atomic scale structure determination, Electron Energy Loss Spectroscopy to probe plasmon excitations, Angle Resolved Photo Electron Spectroscopy for occupied, and Angle Resolved Reflected Electron Spectroscopy for unoccupied band structure sampling, measurements of energy-dependent electron mean free paths, 2D and 3D sensing of surface and free-space potential landscapes, etcetera. I will also present new and ongoing developments in chemical characterization, as well as damage-free imaging of sensitive samples in vacuum and liquid environments. Taking advantage of these state-of-the-art spectroscopies, LEEM and PEEM have therefore become much more than simple imaging methods, offering powerful opportunities for a broad range of applications in science and technology.

Biography:

Rudolf Tromp received a degree in physics from Twente University in 1976, and a PhD in Physics and Mathematics from Utrecht University (cum laude) in 1982. In 1983 he joined the IBM T.J Watson Research Center in Yorktown Heights, NY, where his research has focused on semiconductor surfaces, interfaces, and processes, including epitaxial thin film growth, silicide formation, phase transitions, quantum dot and nanowire formation, thermodynamics, etcetera. He has developed several advanced experimental techniques, including Medium Energy Ion Scattering, spectroscopic Scanning Tunneling Microscopy, Low Energy Electron Microscopy and Spectroscopy, in-situ Transmission Electron Microscopy, and others. Several of these inventions, including a state-of-the-art aberration corrected Low Energy Electron Microscopy system, have been commercialized and are in use in laboratories worldwide. Tromp has published about 270 refereed papers, several book chapters, and 50 United States and International Patents. In 2006 he accepted (in addition to his position at IBM) an appointment as professor at Leiden University in the field of Physics of Surfaces and Materials. He is the recipient of several awards, including the Davisson-Germer Prize (APS), Medard Welch Medal (AVS), MRS Medal (MRS), Distinguished Lectureship Award on the Applications of Physics (APS), and the Distinguished Scientist Award in Physical Sciences (MSA). He is a Fellow of APS, AVS, MRS, and MSA, and a member of the National Academy of Engineering.

Tromp's publication and citation record can be found at
https://scholar.google.com/citations?user=SG_1ZVoAAAAJ&hl=en

Host: Prof. David Smith

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