Featured Researcher

Dr. Herbert Wormeester

Associate Professor Wormeester is right at home at the University of Twente. He grew up in the Netherlands and first came to the university to study physics. As a masters student, he studied valence band spectroscopy with Auger spectroscopy during initial oxidation of silicon. He continued at Twente for a doctoral degree, adding research on optical anisotropy of silicon and germanium surfaces. Initially, he tried to measure optical anisotropy of Si(110) with reflectometry, but concluded it could be done better with an ellipsometer at normal incidence. All components for a home built ellipsometer were present in the group. However, the computer system changed, which forced him to start by programming the computer control, in particular the data collection and analysis programs. The first successful measurements were completed during a World Championship of soccer. The group prepared the experiment before the first half and would measure during intermission. Unfortunately, they missed the second half because their measurements were successful! In the end, his thesis described optical and electron spectroscopy of Si and Ge surfaces.

Dr. Wormeester's current research is on several topics:
1) Nanopatterning through growth and erosion of metal surfaces. This work involves both understanding the basic processes in growth as well as using nanopatterned surfaces to alter physical properties, such as wetting and adhesion. Characterization is dominated by electron and helium diffraction and Scanning Probe Microscopy (SPM). However, he is also using optical anisotropy measurements to monitor in-situ the development of a ripple structure by ion erosion. Ellipsometry provides one of the few techniques for in-situ monitoring during ion bombardment.

2) Ultra-high Vacuum AFM and Electrostatic Force Microscopy of oxides. This area combines measurement of morphology and physical properties on a very relevant length scale. For instance, one can identify trapped charges in a thin oxide layer.

3) Optical properties of nano-colloidal films. In past years, he has used thin-island film theory to quite accurately describe the optical response of metal nano-colloidal films. Effective medium theories fail to provide an accurate model, due to interface effects and nearest neighbor interactions.

Dr. Wormeester's research is aided by three Ph.D. students and one post doctoral student. Dr. Wormeester regularly attends the annual American Vacuum Society (AVS) conference and the German Physical Society conference (DPG). He enjoys the AVS because it focuses on interesting themes. The DPG is beneficial as it brings together active researchers and Ph.D. students in central Europe.

Dr. Wormeester likes to spend his free time on photography and bicycling. For the latter, his family often uses a tandem bike, as all three can ride together and arrive at the top of a mountain almost simultaneously. Traveling to mountainous areas around Europe is a popular destination for vacations. This past year, he spent three months at Lawrence Berkeley National Laboratory in Berkeley, California. There he enjoyed riding his bicycle each morning, including a 250 meter climb.

For more information on Dr. Wormeester's research areas, please check the following publications:

On nanopatterning through ion bombardment:
F. Everts, H. Wormeester and B. Poelsema, "Optical anisotropy induced by ion bombardment of Ag(001)", *Physical Review B* **78**(15), 155419 (2008).

On metal colloids:
H. Wormeester, E.S. Kooij and B. Poelsema, "Effective dielectric response of nanostructured layers", *Physica Status Solidi A,* **205**(4), 756-763 (2008).