

Education in Nanotechnology through Microscopy Made Easy

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ABSTRACT

This paper introduces the strength of the Nanosurf instruments for education. Several practical examples reaching from general public programs to graduate diploma projects are presented.

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1 INTRODUCTION

Well-trained young microscopists are essential both for the advance of microscopy and the advance of natural sciences. This is particularly true in nanotechnology, where only an understanding of scale, metrology, instrumentation and the fundamental physics behind the observation methods allows an understanding of the observed structures and surfaces. True practical work to illustrate the often difficult theory behind different microscopy techniques frequently cannot be carried out because undergraduate students cannot be trusted with expensive equipment, or because time on the microscope is precious and purchasing multiple microscopes is prohibitively expensive. This presentation uses practical examples from nanotech education and scanning probe microscopy (SPM) to show how different educators overcome these obstacles and offer their students hands-on microscopy training.

2 INSTRUMENTATION

Nanosurf offers both scanning tunneling microscopes (STM) and atomic force microscopes (AFM) that have been developed with three criteria in mind: ease of use, affordability, and portability. These characteristics allow both easy mobile classroom demonstrations and more sophisticated exploration in student labs. Developed in response to an inquiry by a high school teacher, the Nanosurf easyScan STM has been sold over 700 times at the time of writing, increasing its popularity with the launch of the new Nanosurf easyScan 2 line in 2005. A modular STM/AFM system like this serves both as an introduction of a new generation to the principles of SPM and as an efficient entry into advanced high-precision surface inspection for the current generation of students, researchers and industry.

3 PRACTICAL EXAMPLES

Nanosurf makes an effort to stay in touch with the needs of nanotechnology education by regularly organizing a Teaching Scanning Probe Microscopy and Nanotechnology (TSPM+N) Seminar. This one-day seminar on teaching SPM and nanotechnology is a platform for persons in charge of teaching at colleges, universities and in industry. The seminar offers the occasion to share teaching experience with experts from all continents. The examples which will be presented are taken from contributions of the TSPM+N 2006 seminar:

- Outreach programs for general public.
- Summer school for high school students (figure 1).
- Annual high school teacher's training day (figure 2).
- Graduate student education program.
- Individual graduates diploma projects.

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Figure 1: Summer school students



Figure 2: Annual teacher's day.