FA Application Case Study

Expanding the Boundaries of Materials Science

About Rebecca Cortez

Dr. Rebecca Cortez is a materials scientist in the Mechanical Engineering Department at Union College. Current research includes the morphological and electrical characterization of nanoscale materials and thin films. She has also been involved in the fabrication and characterization of radio frequency micro-electromechanical systems (MEMS) devices; low-cycle and fretting fatigue testing of metal alloys; and thermal plasma arc processing for heavy metal immobilization.

Dr. Rebecca Cortez is actively pursuing advanced research in materials science in her role as an Associate Professor of Mechanical Engineering at Union College in New York. She has participated in numerous interdisciplinary projects on topics ranging from the fatigue of solder in personal computers to turbine blade alloy fatigue. At the same time, she serves as Director of Undergraduate Research and is dedicated to developing the next generation of scientists. In both roles, she calls upon the Cascade EPS150FA probe station to explore the properties of novel materials down to the nanometer level.

Dr. Rebecca Cortez divides her time at Union College in Schenectady, NY between two separate, but related roles. As an Associate Professor of Mechanical Engineering, she teaches materials science and actively engages in research on the subject. As Director of Undergraduate Research, she prepares students from a variety of disciplines for the rewards and challenges they will encounter when they move on to postgraduate work.

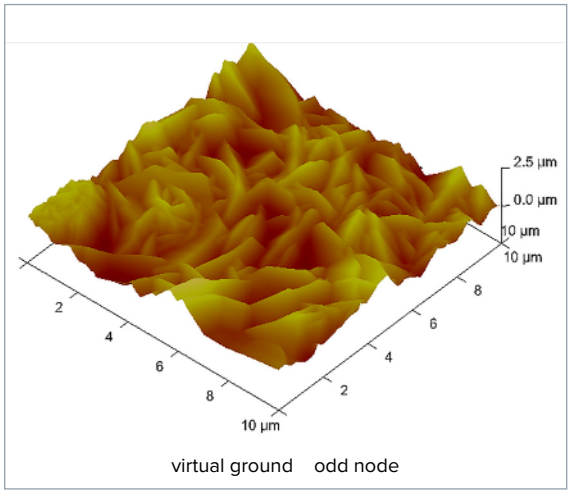

Figure 1: This image, taken with Union College's atomic force microscope, reveals detailed nanostructures within a deposition of zinc oxide.

Dr. Cortez's professional background has prepared her well for both roles. Over her career, she has published a variety of papers on the properties and behavior of materials ranging from polyaniline films to zinc oxide nanoparticles, as seen in Figure 1. She draws upon this considerable experience to introduce students to a research methodology that includes

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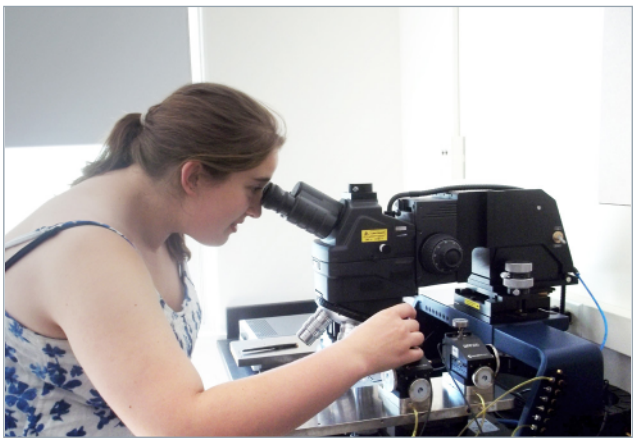

Figure 2: A student researcher operates a Cascade EPS150FA probe system to acquire data on the electrical behavior of newly synthesized materials.

how to leverage test and measurement systems to maximum effect. At Union College, the research laboratory includes sophisticated instrumentation used by students from diverse disciplines including chemistry, physics, biology and engineering. In the laboratory, you will find devices like an atomic force microscope that lets teachers and students view the structure of matter literally at the atomic level (Figure 1). You will also find an EPS150FA probe station from FormFactor, which is dedicated to probing the electrical properties of experimental materials (Figure 2).

The EPS150FA probe station is an essential component in many of the laboratory's ongoing research projects. Nanocomposites for new solar energy

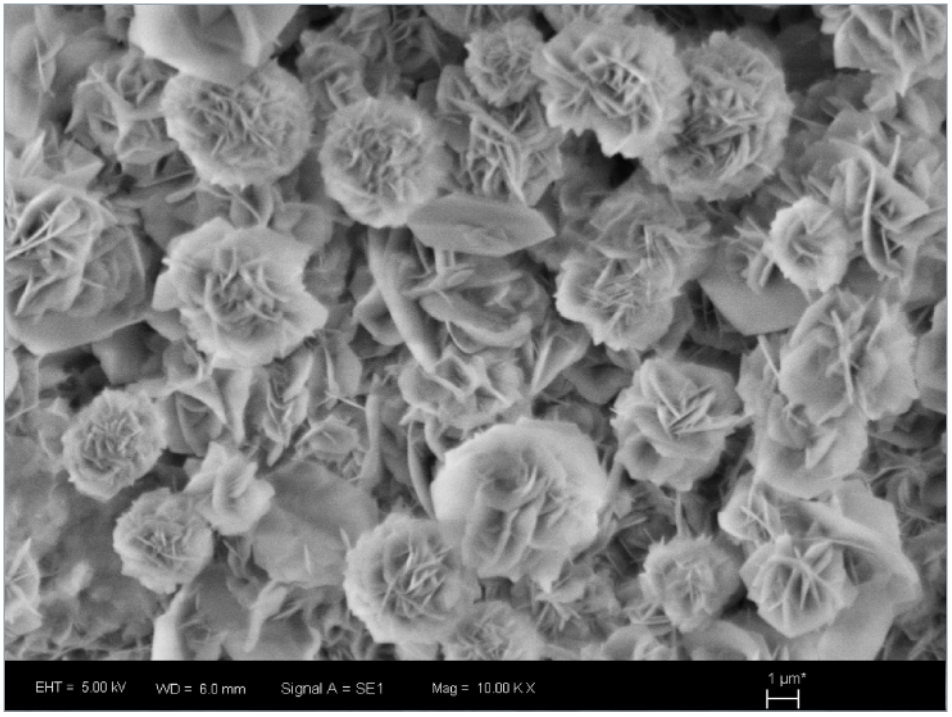

Figure 3: Zinc oxide nanostructures as imaged by an electron microscope. Note the reference scale of one micrometer.

materials offer a good example, as seen in Figure 3. As the composite layers are built up on a substrate, the photoelectric properties often change.

“The EPS150FA probe station is an excellent learning tool as well as an essential research instrument.”

To characterize this change, a series of I-V curves is generated via a source/measure instrument in conjunction with the precision probe capabilities of the EPS150FA probe station, which is capable of probe tip placement down to a resolution of 30 µm.

For her students, Dr. Cortez regards the EPS150FA probe station as an excellent learning tool as well as an essential research instrument. They gain valuable experience in probe operations that will follow them into the post-graduate world of advanced research. At the same time, EPS150FA probe station is helping to characterize a whole new generation of novel materials that show promise across many different industries and fields of knowledge. FormFactor is proud to support Dr. Cortez and her fellow researchers with our precise, accurate probing tools. We have a fundamental commitment to helping the academic community make progress and advance discovery in all of the physical sciences.

The EPS150FA Probe System Meets Your Lab Requirements

“EPS150FA has highest accuracy using optimized high magnification optics up to 4000X on a rigid microscope bridge.”

Contact submicron features with less effort by using

/ Positioner with a resolution of 200 TPI

/ High magnification optics up to 4000x

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/ 40 mm platen drive

/ 10 mm chuck Z adjustment

/ Positioner with vacuum bases

/ A chuck which is ready for single DUT

Highly confident measurement results through a contact stability, driven by

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/ 16 mm stainless-steel stable probe platen

/ ± ≤3 µm chuck and stage planarity

The ability to reconfigure and upgrade your probe system enables you to stay flexible and protects your investment

/ The modular design

/ The unique upgrade paths including laser cutter

The probe system incorporates the best-known methods for electrical failure verification, localization and debug with the ability to probe features smaller than 1 µm.

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