

Microscopy as a Cross-curricular Tool to Link Science and Art

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In high school, the microscope is as synonymous with science classrooms as the paintbrush is to an art class. In most cases, the work done in one of these classes does not cross over or have relevance to the other. However, the microscope, specifically the scanning electron microscope (SEM), presents students with a unique opportunity to blend the distinct worlds of science and art. The goal of the following exercise was to introduce art students to microscopy, a technology they would not encounter in their normal course of study, and for them to use the data collected to learn how to use Adobe® Photoshop® software.

Sophomores from the school's Visual and Performing Arts Academy who were enrolled in the *Design and Production Technology* course took part in the exercise. A portion of the course is devoted to introducing the class to Adobe® Photoshop® in order to learn the basics of colorization and graphic design. For this exercise, instead of moving directly into learning Photoshop®, students first toured the school's microscopy lab (known as the Nano-Structural Imaging Lab at the Bergen County Academies). The goal was to give the students an introductory lesson on the electron microscopes, both scanning and transmission, and the types of images that could be acquired using each. Students were then given the task of bringing in a sample with interesting texture, small features, or an item of general interest to image using the SEM. Examples of student samples included flower petals and assorted plant tissues, translucent seashells, feathers, wires, electronic components and computer chips, and insects.

Once the samples were prepared, students then visited the lab to image their own samples in a one-on-one setting with the staff. During the session, students were trained on how to operate the SEM and learned the theory behind how the instrument generated an image. The excitement of viewing their samples using the SEM appeared to make the students more responsive to learning about the science behind microscopy.

Students were also taught about the ethics in image alteration and editing prior to using Photoshop®. The students learned about the importance of the scale bar and reasons why image alteration is unacceptable in the world of science. It was then explained that for this exercise, the image alteration was being performed for artistic purposes rather than scientific, and when viewed simply as art, the digital enhancement and colorization was acceptable. Students then returned to their graphic arts class to learn how to use the software and began colorizing their images (Figures 1 and 2).

This exercise not only served to expose art-minded students to microscopy, but also proved that microscopy can extend beyond data-driven research in the sciences. "Spark" events such as this are a great way to excite students in grades K-12 about microscopy while also creating a meaningful

experience tailored to students' particular interests, as opposed to general tours or information sessions.

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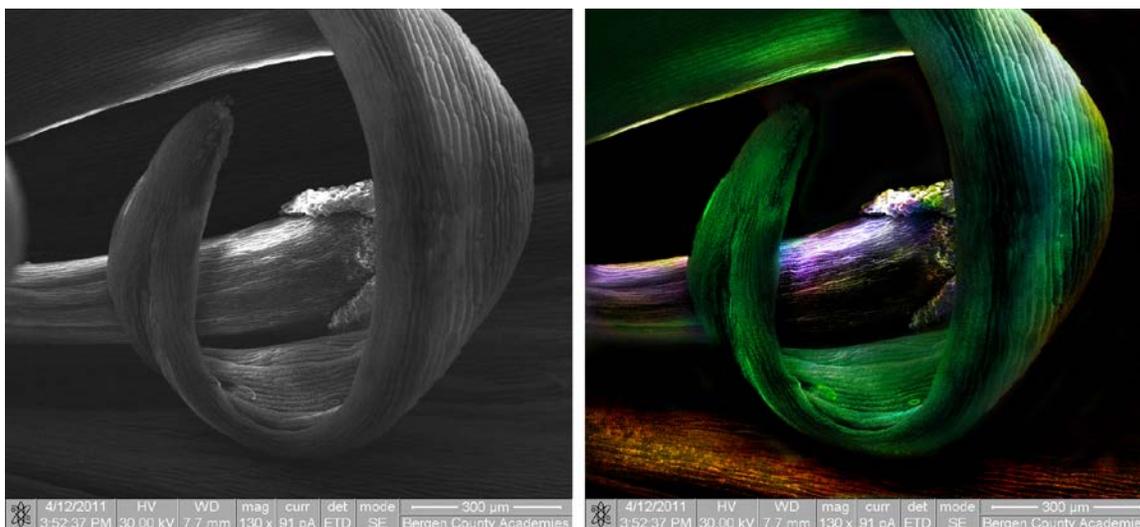


Figure 1: Original SEM micrograph (left) and colored image (right) of a flower petal.

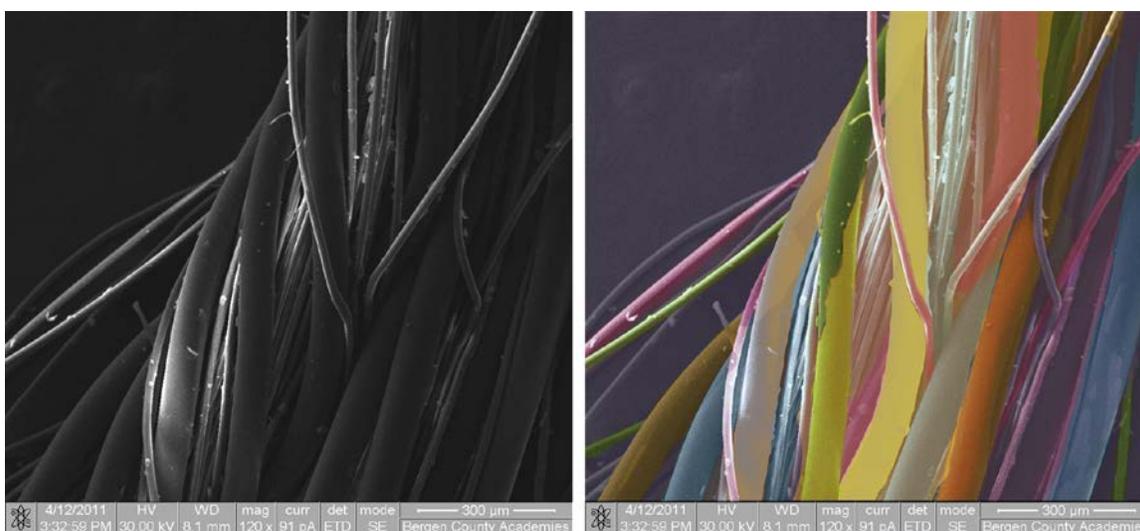


Figure 2: Original SEM micrograph (left) and colored image (right) of the wires in a pair of headphones.