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Project MICRO: Microscopy For Middle Schools

Project MICRO (Microscopy In Curriculum - Research Outreach) is a collaboration being developed between the Microscopy Society of America (MSA) and the Lawrence Hall of Science (LHS) in Berkeley, a leading science education museum. It is designed to provide both MSA members and teachers with the skills and teaching materials needed to use microscopy in the classroom. We won't teach "microscopy"; rather, we'll use inexpensive light microscopes as an exciting tool to introduce the methods of scientific inquiry and discovery.

The MSA-LHS program has four components. First, educational inservice workshops for teachers and MSA volunteers will be held at ten regional sites. There will be a prototype workshop at the LHS in November '94; the regional sponsor will be the Northern California Society for Microscopy, a MSA affiliate. At this workshop, participants will be introduced to activities that introduce the microscope as a scientific tool to help students investigate and understand the natural world. Individual partnerships will also be formed between teachers and MSA volunteers. Second, these partners, along with parents, will then lead a station format "Microworld Festival" as a kickoff event to introduce the use of microscopes at each participating school. Third, teacher and MSA volunteer partners will then continue leading activities with students in classrooms throughout the year. Finally, all participants will attend a follow-up meeting at the end of the year to provide suggestions and feedback. Local site coordinators and volunteers will meet annually at the MSA national meeting. Project MICRO will expand nationally through MSA's thirty Local Affiliate Societies; the target audience for the project is 200 5th-8th grade teachers, 200 MSA volunteers, 100 parents, and 30,000 students at ten sites nationwide.

The program builds on the successful LHS STEP (Scientists and Teachers in Educational Partnerships) program, funded for three years by NSF through its Private Sector Partnerships program. LHS STEP uses a one-day educational inservice workshop to introduce teachers and scientists to well-tested, guided discovery method activities for classroom use. Teacher and scientist partners work side by side to learn the activities, as well as planning for classroom meetings. Partners then participate in classroom activities as a team throughout the academic year. Development of the present program has been supported by the Fannie and John Hertz Foundation for the Advancement of Applied Science and the NSF programs for Instructional Materials Development and Instrumentation and Instrument Development.

The instructional materials used at the inservice workshops will include two guides form the LHS GEMS (Great Explorations in Math and Science) series, the "Microworld Festival" (now in prototype form) and "More than Magnifiers". The "Microworld Festival" will provide teachers and volunteers with step-by-step instructions for a station format microscopy experience. It will include a variety of interactive interdisciplinary activities from the life, earth, and physical sciences. "More than Magnifiers", which introduces the properties and uses of microscopes, lenses, and other magnifiers as scientific tools, will be used during follow-up for classroom use. This guide, along with other LHS-developed classroom activities will engage students in using microscopy to explore such topics as microorganisms from a variety of habitats, optics, and earth materials. Each participant will receive both GEMS guides, and each local site will receive a set of materials to lead a Microworld Festival, for use in their schools.

San Francisco Bay Area microscopists will have a chance to be the first participants in MSA's program. This promises to be an exciting, rewarding opportunity to contribute to the science education reform effort. We'll select six volunteers and six partner/alternates to work with six teachers. Pairing will be based on volunteer preference, by work or home location. There is a substantial time commitment involved (training plus at least 4 classroom days), so think about your level of dedication before you volunteer. Since this is a prototype situation, requiring interaction with the LHS, we must restrict participation to the immediate Bay Area. Everyone who is interested will be welcome to attend the all-day training session on Thursday, November 17, at the LHS.

Mei Lie Wong (415-476-4441) will chair the program for the Northern California Society for Microscopy, and Caroline Schooley (707-964-9460) is the MSA Outreach Coordinator. Either will be happy to talk your ear off if you have questions. ■

Front Cover Image
Raman Imaging Microscopy of Polymer Domains

Shown on the cover are Raman images and spectra of a model polymer composite comprised of 5 μm diameter polystyrene microspheres embedded in a Nylon polymer matrix. The spectral images are acquired with a novel Raman spectroscopic imaging microscope. This spectral imaging system employs an acousto-optic tunable filter (AOTF) integrated with an infinity-corrected optical microscope and a slow-scan charge-coupled device (CCD) detector.

The image in the center is a brightfield image. The contrast is poor due to the closely matched indices of refraction of the two components. The high contrast Raman image in the upper left corner readily illustrates the polystyrene distribution. The Raman image is generated by tuning the AOTF to the CH stretching region at 3050 cm^{-1}. In the Raman imaging analysis, the AOTF is tuned systematically across the entire Raman spectrum. The Raman microspectra at the top right is extracted from the spatial/spectral data set and is definitive of poystyrene. The Raman image in the bottom right corner corresponds to Nylon and is collected at 3400 cm^{-1}, the NH stretching region. The Raman microspectra at the bottom left is plotted from the matrix region and is definitive of Nylon.

Raman microscopy is a powerful analytical imaging tool for materials characterization. Until recently the methodologies employed for high definition Raman imaging were relatively cumbersome. With the advent of tunable filter technology, Raman imaging is well suited for the rapid, non-invasive, chemical visualization of heterogeneous materials. An important advantage of Raman imaging is that contrast is generated by monitoring the vibrational spectral bands intrinsic to the material, and does not require the use of stains and tags.

The Raman imaging is performed by Michael D. Schaeberle and Patrick J. Treado of the University of Pittsburgh, Department of Chemistry, Pittsburgh, PA 15260; (412)624-8621; e-mail: treado+@pitt.edu.

MICROSCOPY TODAY

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