Ready for Nashville!
M&M 2011 Conference & 44th IMS Annual Meeting

The Microscopy & Microanalysis 2011 Conference and 44th International Metallographic Society Annual Meeting will take place August 7-11 at the Nashville Convention Center in downtown Nashville, Tenn. The event promises to deliver a diverse technical program, educational short courses, excellent vendor exhibits, and the fun social activities. The conference symposia cover a wide array of microscopy techniques and a variety of materials, with sessions in metallography for failure analysis, SEM, EBSD, and microscopy of joining techniques including welding, brazing, and soldering. The events of interest to IMS are listed below, and the full list of events can be found on the IMS website at www.internationalmetallographicsociety.org.

The Sunday reception will be held at the Renaissance Nashville Hotel, and the Monday plenary session will include a presentation entitled “Nanoscopy with Focused Light,” by Prof. Stefan Hell.

“It’s a Family Affair” will be held again this year, so bring the kids to learn about microscopes and materials science through exciting demonstrations and tours of the exhibit hall.

We look forward to seeing you in Nashville!

Don Susan and Dustin Turnquist — M&M/IMS 2011 Co-Chairs

SHORT COURSES OF INTEREST TO IMS MEMBERS

SUNDAY, August 7
8:30 a.m. – 5:00 p.m.
X-22 How to Organize and Run a Failure Investigation
Instructor: Daniel Dennis
8:30 a.m. – 5:00 p.m.
X-19 Scientific Digital Imaging: Ethics and Execution
Instructor: John Mackenzie

PLENARY SESSION

MONDAY, August 8, 9:00 a.m. - 10:45 a.m.
Session Chairs: N. Zaluzec, MSA; J.H. Scott, MAS; and N. Saenz, IMS
Ballroom
9:00 a.m. MSA Awards and Fellowships; N. Zaluzec, MSA
9:15 a.m. Plenary Speaker: Dr. Gene Ice, X-ray Micro/Nanoprobe Characterization Using Synchrotron Sources
10:30 a.m. IMS Awards Presentation, N. Saenz, IMS
10:30 a.m. MAS Awards Presentation, J.H. Scott, MAS
10:45 a.m. Plenary Speaker: Prof. Stefan Hell, Nanoscopy with Focused Light

SESSIONS OF INTEREST TO IMS MEMBERS

MONDAY, August 8, 1:30 p.m. - 5:00 p.m.
1:30 p.m. - 2:30 p.m.
Nashville Convention Center
Room 211/212
IMS Henry Clifton Sorby Award Lecture
Reflections on Microscopy & Analysis: From Viewing the Small World to Leading on a Larger Stage
Lecturer: Dr. David B. Williams, FASM, Dean, College of Engineering, Ohio State University
1:30 p.m. - 3:30 p.m.
P07B Microscopy and Microanalysis Applications in Cultural Heritage Research
This symposium will focus on where the application of microscopy and microanalysis techniques can aid cultural heritage research, principally in the areas of conservation, maintenance, provenance, and restoration.
Session Chairs: John Mansfield, Ed Vicenzi, and Cathy Selvius DeRoo
Room 201

(continued on page 4)
I hope you had a chance to attend M&M 2010 in Portland, which was our 43rd Annual Meeting. It was another successful meeting thanks to co-chairs Jaret Frafjord and Don Susan. Many interesting papers were presented, professional connections established, old acquaintances renewed, and the latest in instrumentation on display for examination at the exposition.

Several social events took place in beautiful surroundings and in great weather. The Ice Breaker on Monday was sponsored by IMR Test Labs and Precision Surfaces International – thank you! The Ice Breaker is a great place to socialize. The awards banquet took place at the Bridgeport Brewery. We thank Buehler for sponsoring the wine. Great conversations and food was had by all.

This year I had the pleasure to bestow the President’s Award on Jaret Frafjord for his exceptional service to the Society. He co-chaired the past three annual meetings and did an incredible job. Thank you Jaret!

With regrets, we accepted the resignation of Richard Ryan as chair of the Sorby Award Selection Committee. Dick is a founding member of the Society and has been involved since 1968 in many capacities. He has attended 41 of our 43 meetings. The reason for missing two years was that he was posted in Asia. From 2001 to 2003, he served as IMS president, and in 2007, he received the President’s Award. Dick is an incredible example for volunteerism. We wish we had many more like him. We know that the meetings will not be the same without Dick and his thoughtful advice. But in spite of the fact that he will no longer attend the meetings, he will still be involved in the society and donate his time. Dick has agreed to work with David Fitzgerald and Elliot Clark on the revision of the by-laws of the society. Thank you, Dick, for all you have done for IMS.

All of us who have volunteered their time either for IMS or for any other club or organization know that we have received more in return than we have invested. How about getting involved with IMS. You will not regret it. We can use your help!

Frauke Hogue, President
International Metallographic Society
The montage image is a photographic technique that has been used for many years by photographers and metallographers alike. It is useful for piecing together a wide field of view from individual images. We commonly appreciate this technique in panoramic landscapes. In metallography, a low magnification is required to capture an entire area of interest, but this is achieved at the sacrifice of resolution. The solution is to create a montage image; capturing several images at higher magnification and piecing them together into one large image. The image then covers the entire region of interest and retains the resolution obtained at magnification.

Traditionally, especially with photographs, this task required considerable time and effort, but as digital imaging became established the process could be performed using software. For years, I used Photoshop to manually make montage images by opening a large empty canvas and dragging individual images into one montage. This took time and effort as well but, in addition, it often left visible seams between images, and if there was uneven illumination in the individual micrographs the final montage took on a patch-quilt appearance (Fig. 1). There are several software packages that can stitch images into a montage, however if you have Photoshop CS3 or later, there is a built-in script that will do it for you. The only critical prerequisite is that adjacent images have a mutual overlap of at least 20%.

In CS4, the script is called Photomerge and is found under: File> Automate> Photomerge (Fig. 2) In the Photomerge panel, there are several layout options and a browse button to select the images to put into the montage (Fig. 3). In this case, I used the “Browse” button to find six images to integrate and the “Auto” layout option. To eliminate visible seams and lighting variations between images, check the “Blend Images Together” option at the bottom of the panel. Click the OK button. Depending on the number and size of your images, Photoshop will take a few moments to compile the montage image (Fig. 4).
Ready for Nashville!

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1:30 p.m. Non-Destructive Investigation of Pre-Columbian Goldwork from Panama with Variable Pressure Scanning Electron Microscopy; Ainslie Harrison; National Museum of the American Indian, Smithsonian Institution

2:00 p.m. Combining SEM-EDS, PIXE and XRF Techniques for Complex Analytical Problems: Depth Profile Characterization of Prehispanic Gold; A. Perea; Consejo Superior de Investigaciones Científicas, Madrid, Spain

2:15 p.m. Fingerprinting Gold Leaf from Portuguese Baroque Altarpieces; A.P. Bidarra; Aveiro University, Portugal

2:30 p.m. Technology and Trade at Ancient Gordion: Insights from Microanalysis of First Millennium BCE Glass; Karen Reade; University of Sydney, Australia

3:00 p.m. The Colors and Techniques of 17th Century Portuguese Azulejos: A Multi-Analytical Study; Susana Coentro, Universidade Nova de Lisboa, Portugal

3:15 p.m. Micro-Computed Tomography Applied To Museum Collections; Alexander Ball; The Natural History Museum, London, UK

3:30 p.m. - 5:00 p.m. (POSTER SESSION) 13 posters from Session P07P1 Exhibit Hall

TUESDAY, August 9, 8:00 a.m. - 5:00 p.m.

8:00 a.m. - 12:00 noon
P07C Microscopy and Microanalysis Applications in Cultural Heritage Research
This symposium will focus on where the application of microscopy and microanalysis techniques can aid cultural heritage research, principally in the areas of conservation, maintenance, provenance, and restoration.
Session Chairs: John Mansfield, Ed Vicenzi, and Cathy Selvius DeRoo
Room 201

8:00 a.m. Surface Characterization of 19th Century and Modern Daguerreotypes using High-Resolution SEM; Patrick Ravines; University at Buffalo

8:30 a.m. The Skin of Van Gogh's Paintings; Joris Dik; Delft University of Technology, The Netherlands

9:00 a.m. Use of X-Ray Mapping to Investigate Art Works before their Restoration; Richard Wahrer; University of Technology, Sydney, Australia

9:15 a.m. AFM in the Conservation of Contemporary Paintings: the Case of the White Paintings of Julião Sarmento; Ana Pereira; Universidade Nova de Lisboa, Portugal

9:30 a.m. Micro-Computed Tomography Applied To Museum Collections; Alexander Ball; The Natural History Museum, London, UK

10:00 a.m. COFFEE BREAK

10:30 a.m. SEM and XEDS Analysis of Paint Layers on a 1907 Model G White Steam Touring Car from The Henry Ford Museum Collection; John S.W. King; University of Michigan

10:45 a.m. Materials Evaluation and Monitoring of a Large-Scale Conservation Project: Eight Monumental Sculptures by A.M. Calder; Andrew Lins; Philadelphia Museum of Art

11:15 a.m. Compositional Analysis of Corrosion Products from Rodin's Eve; Amy Hemmati; National Institute of Standards and Technology

11:30 a.m. Microstructure of Woolen Fiber Dyed by PbCrO4 Yellow Dyeing Technique Imported into Japan in the Middle of the 19th Century; Nahoko Sugioka; Tokyo University of the Arts, Japan

9:00 a.m. – 12:00 noon
A11A Effects of Metallographic and Other Preparation Techniques on Microstructural Characterization
This symposium will cover all aspects of specimen preparation for metals, ceramics, composites, polymers, microelectronics, and virtually any other material, as they influence characterization techniques.
Session Chairs: George Vander Voort, Struers Inc.; Sidnei Paciornick, Pontificia Universidade Catolica do Rio de Janeiro, Brazil; and James Martinez, NASA Johnson Space Center Room 211/212

9:00 a.m. Metallography as a Microanalysis Tool during the Failure Investigation of the Starboard Solar Alpha Rotary Joint of the International Space Station; Victoria Long; NASA, Kennedy Space Center, Fla.

9:30 a.m. Precipitation and Sensitization of Type 304L Stainless Steel: Correlation of the ASTM A262 Practice A Test with Analytical Electron Microscopy; M. Miller; Bechtel Marine Propulsion Corp., West Mifflin, Pa.

9:45 a.m. Understanding the Manufacturing Process of Molybdenum 47.5% Rhenium Sheet Through Examination of Microstructures at Steps of Processing; Todd Johnson; Rhenium Alloys Inc., Elyria, Ohio

10:00 a.m. COFFEE BREAK

10:30 a.m. Image Analysis Characterization of Modern Pipe Steels Structures; Alexander Kazakov; Saint Petersburg State Polytechnical University, Russia
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11:00 a.m. UV Treatment of TEM STEM Samples for Reduced Hydrocarbon Contamination; David Hoyle; Hitachi High-Technologies Canada Inc., Etobicoke, Canada

11:15 a.m. Large Thin Area Preparation of Cross-Sectional TEM Specimens of III-V Semiconductors; J-G Zheng; University of California, Irvine

11:30 a.m. Metallographic Preparation Techniques for Evaluation of Co-Cr-Mo Alloys; C. McNee; IMR KHA-Portland, Oreg.

11:45 a.m. Metallographic Preparation of Space Shuttle Reaction Control System Thruster Electron Beam Welds for Electron Backscatter Diffraction; James Martinez; NASA Johnson Space Center, Houston, Tex.

1:30 p.m. – 2:45 p.m.
A11B Effects of Metallographic and Other Preparation Techniques on Microstructural Characterization
This symposium will cover all aspects of specimen preparation for metals, ceramics, composites, polymers, microelectronics, and virtually any other material, as they influence characterization techniques.
Session Chairs: George Vander Voort, Struers Inc.; Sidnei Paciornick, Pontificia Universidade Catolica do Rio de Janeiro, Brazil; and James Martinez, NASA Johnson Space Center, Houston, Tex.

1:30 p.m. – 2:45 p.m.
A11B Effects of Metallographic and Other Preparation Techniques on Microstructural Characterization

1:30 p.m. The Importance of Sample Preparation in the Analysis of Powder Metallurgy (PM) Materials; Thomas Murphy; Hoeganaes Corp., Cinnaminson, N.J.

2:00 p.m. A Novel Preparation Method for Lean Duplex Steels; M. Panzenböck; Montanuniversität Leoben, Austria

2:15 p.m. Delineating Prior Austenite Grain Boundaries in Carbon Steels; Samuel Lawrence; Lehigh University, Bethlehem, Pa.

2:30 p.m. Obtaining Consistent Vickers Hardness at Loads = 100 Grams Force; George Vander Voort; Struers Inc., Wadsworth, III.

8:30 a.m. – 11:00 a.m.
X90A Microscopy in the Classroom: How to Use it and How to Teach It

Session Chairs: Donovan N. Leonard, Oak Ridge National Laboratory and Sherry Cady, Portland State University Room 109

8:45 a.m. Introductory Remarks
9:00 a.m. Pushing the Rock up the Hill: Teaching Imaging Technology in the Classroom; R. Simmons; Georgia State University

9:15 a.m. Teaching Transmission Electron Microscopy to High School Students; J. McBride; Vanderbilt University

9:30 a.m. Bergen County Academies: A Model for Graduate-Level Research and Technology in a High School Setting; A. Calabro; Bergen County Academies, N.J.

9:45 a.m. 1, 2, 3 SEM: Teaching Scanning Electron Microscopy to Community College Faculty and Staff; N. Butkevich; Schoolcraft College, Livonia, Mich.

10:00 A.M. COFFEE, DEMOS, POSTERS, AND DISCUSSION

10:45 a.m. Community College Students Attitudes toward Scanning Electron Microscopy; J. Watkins; Schoolcraft College, Livonia, Mich.

11:00 a.m. The ASM Materials Education Foundation Materials Camp® Program-Introducing High School Teachers and Students to Materials Science; J. Frafjord; IMR KHA-Portland; C. Hayes; ASM Materials Education Foundation, Materials Park, Ohio

11:30 a.m. Prize Drawing, Closing Remarks

3:30 p.m. - 5:00 p.m. (POSTER SESSION) 7 posters from Session A11
Exhibit Hall

WEDNESDAY, August 10, 9:00 a.m. – 5:00 p.m.

9:00 a.m. – 12:00 noon
P06A Failure Analysis: Applications of Electron and Optical Microscopy
This symposium will cover all aspects of failure analysis including metallography, SEM fractography, and other forensic techniques (including NDE) for the interpretation of failures.
Session Chairs: Michael He and Gabe Lucas, Scot Forge; Dave Norfleet, Engineering Systems Inc.
Room 211/212

9:00 a.m. Structure Inhomogeneity and Failure Analysis of Modern Pipe Steels; A. Kazakov; Saint-Petersburg State Polytechnical University, Russia

9:30 a.m. Evaluation of a Turbocharger Turbine Wheel; J. McDougall; Engineering Systems Inc.
9:45 a.m. Failure Investigation of a 4340 Steel Forge Knock-Out; Michael He; Scot Forge

10:00 A.M. COFFEE BREAK

10:30 a.m. Quantitative Fractographic Analysis of the Variability in Tensile Ductility of a High Strength Dual Phase Steel; R.S. Jamwal; Georgia Institute of Technology; S. Bhat; ArcelorMittal, Global R&D

11:00 a.m. Role of Metallography in a Failure Investigation; D. Turnquist; Engineering Systems Inc.

11:15 a.m. Examples of Stress Corrosion Cracking in Copper Piping for Heating and Cooling Systems; Mark Hineman; Engineering Systems Inc.

11:30 a.m. Fracture in Hierarchical Biomaterials: Human Hair; G Alejandra G.A. Camacho-Bragado; L'Oreal

11:45 a.m. Analysis on Structural and Chemical Behavior with Cycles in PRAM; K. Hwang; Samsung Electronics, Korea

1:30 p.m. – 3:30 p.m. P06B Failure Analysis: Applications of Electron and Optical Microscopy
This symposium will cover all aspects of failure analysis including metallography, SEM fractography, and other forensic techniques (including NDE) for the interpretation of failures.
Session Chairs: Michael He and Gabe Lucas, Scot Forge; and Dave Norfleet, Engineering Systems Inc.
Room 211/212

1:30 p.m. Failure Analysis of Brass Components; Chirag Shah; Exova Inc.

2:00 p.m. Utilizing Focused Ion Beam (FIB) and Transmission Electron Microscopy (TEM) for Failure Analysis of Char Deposits Obtained From Space Shuttle Columbia Window Debris; M. Wright; NASA

2:30 p.m. Unusual Failure of a Rim Fire Cartridge Brass Casing; F. Schmidt; Engineering Systems Inc.

2:45 p.m. Methanol Pipeline Failure in the Canyon Express System; George Vander Voort; Struers Inc.

1:30 p.m. – 3:30 p.m. P08B Metals, Alloys, and Semiconductors

Session Chairs: Paul Vianco, Sandia National Laboratories, David Hillman, Rockwell-Collins Inc.
Room 209/210

1:30 p.m. Phase Transformations Induced by Mechanical Milling and Sintering in the (Fe,Al)-Fullerenes Composites; Irais Calderon; ESFM-IPN, Mexico

1:45 p.m. Order-Disorder Phase Conversion of FePt Nanoparticles for Ultrahigh-Density Magnetic Recording; A. Johnston-Peck; North Carolina State University

2:00 p.m. Nanostructure Fabrication Based on In-Zn Alloy Evaporation; C. Li; Clarion University

2:15 p.m. Helium Ion Microscope Analysis of Used JLab Photocathode Samples; V. Shuthanandan; Pacific Northwest National Laboratory

2:30 p.m. AEM Study of Oxygen Effect on a Soft Magnetic Alloy; S. Elhalawaty; Arizona State University

2:45 p.m. Observation of Side Bands Modulated Structure in FeTiO3Mn2O3 Alloys; M. Shamsuzzoha; University of Alabama

3:00 p.m. Characterization of Core Shell Cu-Au Nanoparticles by Microscopy Techniques; H. Calderon; ESFM-IPN, Mexico

3:15 p.m. Nanoparticles by Mechanosynthesis in the Immiscible System Cu-Co; H. Angeles-Islas; SFM-IPN, Mexico

3:30 p.m. – 5:00 p.m. (POSTER SESSION) 10 posters from P06 and P08
Exhibit Hall

THURSDAY, August 11, 8:00 a.m. – 5:00 p.m.

8:00 a.m. – 10:00 a.m. P08D Metals, Alloys, and Semiconductors
Session Chairs: Paul Vianco, Sandia National Laboratories, David Hillman, Rockwell-Collins Inc.
Room 209/210

8:00 a.m. Transmission Electron Microscopy Study on the Crystallization of Ion Beam Assisted Deposited CoFeB/MgO/CoFeB Magnetic Tunnel Junctions with Tantalum Capping Layer; R. Petrova; International Iberian Nanotechnology Laboratory, Portugal

8:15 a.m. Toward Simultaneous Assessment of In and N in InGaAsN Alloys by Quantitative STEM-ADF Imaging; V. Grillo; CNR, Italy

8:30 a.m. Direct Visualization of Size-Controlled Au39 Clusters Supported on Hydroxyapatite by AC-STEM; Y. Han; University of Birmingham, UK

8:45 a.m. Characterization of Nanoscale Precipitates in an Al-Zn-Mg-Cu Alloy Using STEMHAADF Imaging; Y-Y Li; Ohio State University

9:00 a.m. Picosecond Time-Resolved Cathodoluminescence to Probe Exciton Dynamics in a plane (Al,Ga)N/GaN Quantum Wells; S. Corfdir; Ecole Polytechnique Fédérale de Lausanne, Switzerland
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9:15 a.m. Gold Nanoparticles on MgO - A Revisit using Cs-Corrected STEM; Y. Han; University of Birmingham, UK
9:30 a.m. HRTEM and HAADF Analysis of Ni Multi-Twinned Nanoparticles; V. Grillo; CNR, Italy
9:45 a.m. In Situ TEM Monitoring of Thermal Decomposition in CdTe and ZnTe Nanowires; K. Davami; POSTECH, Republic of Korea

1:30 p.m. – 4:15 p.m.
P08C Metals, Alloys, and Semiconductors
Session Chairs: Paul Vianco, Sandia National Laboratories, David Hillman, Rockwell-Collins Inc.
Room 209/210
1:30 p.m. Active-Brazed Ceramic-Tungsten Carbide Assemblies for Seal Applications; Charles Walker; Sandia National Laboratories
2:00 p.m. Whisker Formation and Stress Relaxation in Tin Thin Films; Carol Sarobol; Purdue University
2:30 p.m. Coupled Microstructural and Calorimetric Investigation of Controlled Solder Joint Microstructures in Pb-Free Solder; Iver Anderson; Iowa State University
3:00 p.m. Failure Analysis of Crimp Connectors; P. Vianco; Sandia National Laboratories
3:15 p.m. The Microstructure of Unirradiated and Neutron Irradiated Inconel X750; On Woo; Chalk River Laboratories-AECL, Canada
3:30 p.m. Tweezergate: A Cautionary Tale about Sample Preparation; A. Lindstrom; National Institute of Standards and Technology
3:45 p.m. Tomographic Reconstruction of Microstructures in Al-Ni-Y-Based Alloys; M. Gordillo; University of Connecticut
4:00 p.m. In Situ Lorentz TEM Study of Magnetic Domain Wall Mobility in a Martensitic Ni-MnGa Alloy; A. Budruk; Carnegie Mellon University

A list of all M&M Sessions and Short Courses can be found at http://www.microscopy.org/MandM/2011/index.cfm

SATURDAY, August 6
6:30 p.m.
IMS Board, Judges, and Friends dinner
Location: TBD

SUNDAY, August 7
6:30 p.m. – 9:00 p.m.
M&M 2011 Sunday Social Event
Renaissance Nashville Hotel
The Sunday Social Event is a great opportunity to catch up with all your friends, make some new contacts, and enjoy some local Yazoo beer and a delicious southern supper buffet. Afterwards, grab some friends and head out to one of downtown Nashville’s famous honky-tongs, nightclubs, or restaurants for some live music, line dancing, or maybe another beverage or two.

MONDAY, August 8
8:00 p.m. – 10:00 p.m.
IMS Ice Breaker Reception
Renaissance Nashville Hotel, Belmont Room
Sponsored by: Precision Surfaces International and IMR Test Labs

TUESDAY, August 9
3:00 p.m. – 4:00 p.m.
IMS General Members Meeting
Nashville Convention Center

WEDNESDAY, August 10
6:30 p.m. – 9:30 p.m.
IMS Awards Banquet (tickets required)
The Standard Restaurant and Club
Beverage Sponsor: Buehler

2011 International Metallographic Contest

The International Metallographic Contest and Exhibit is being held in conjunction with M&M 2011 in Nashville, Tenn. The contest features the best work of metallographers and microstructure analysts from around the world. Highlights of the rules are shown below. Please visit www.internationalmetallographicsociety.org for detailed rules. For tips on creating a winning entry and for insight into the judging process, please be sure to read the excellent articles by Jim Nelson at www.internationalmetallographicsociety.org/winning.html.

It’s not too late to submit an entry for the 2011 competition. Visit www.internationalmetallographicsociety.org for contest details. Entries must be received by July 22, 2011. Send to:
James Wittig
Vanderbilt University
5617 Stevenson Center
Nashville, TN 37232
Metallography, or the more inclusive materialography, is both the bulwark of ASM’s existence and the underlying science for all its affiliate societies. A metallography certification will be a center of focus for multiple other materials certifications. In 2010, ASM conducted market research to explore the need for, acceptance of, and support for a third party certification program, and the findings were supportive of certification development.

IMS appointed Michael He as the Board Mentor to the certification program. He has been working with the ASM staff liaison for certification, Louise Wehrle, to assemble a committee representative of all metallographic stakeholder groups, which could develop specific policies, write test questions, create body of knowledge documentation, promote the certification, and other tasks.

Certification development at ASM follows the format accepted and required by the testing industry. The steps in this format and their integration are already established with development of the Certified Thermal Spray Operator (CTSO) for the ASM Thermal Spray Society (http://tss.asminternational.org/portal/site/tss/Certification/). ASM and IMS are now engaged in developing a certification program for metallographers.

A certification program development cycle is about two years. In that time, the certification committee subject matter experts impact all aspects of the certification program; from the identifying logo to the examination content.

How is a certification program expected to help an industry or industry segment? Absent a consistently administered training and education program with the same content, there is little in the way of assessment to qualify the metallographer. The certification program is designed to fill this gap: to ensure that those with the knowledge are recognized for that knowledge. In addition, certification has other benefits:

- Certification codifies the practice. The qualification of personnel will allow a company – from the largest to the smallest – to state that their metallographic services are performed in a reliable, consistent and industry accepted manner.

- Certification enhances the perception of metallography as a high-quality process. Increasing the reliability and consistency with which metallography is applied will help to improve its perception and acceptance and help expand its use by more industries and customers.

- Certification provides a self-directed, industry-created hallmark of excellence. This industry-driven program is being built by members of the metallography community and based on the needs of its providers as well as its users.

For more information about the work of the metallography certification committee, please contact Louise Wehrle at 440/338-5151 or certification@asminternational.org.