

# Optical Fabrication and Testing (OFT)

## Topical Meeting

### Collocated With:

[Frontiers in Optics, OSA's 92nd Annual Meeting and Exhibit  
Plasmonics and Metamaterials \(META\)](#)

**Technical Conference: October 21–24, 2008  
The Hyatt Regency Rochester, Rochester, NY, USA**

Optical Fabrication and Testing will bring together experts working in this field to discuss recent advances and to identify future trends. The meeting will cover all aspects of optics fabrication and testing ranging from micro-optics to large optics, and from high-value one-of-a-kind optics to mass-produced optics. The meeting will emphasize new ideas and concepts in fabrication and testing of micro-optics, the fabrication and testing of aspheric optics for optics materials and finishing science. Submission of papers on applied OF&T research and reports on process lessons learned from experiences in production and testing is strongly encouraged. Papers on new ways of teaching optical fabrication and metrology are also solicited.

## **About Optical Fabrication and Testing**

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# Meeting Topics to Be Considered

## 1. Optical Materials

- New materials for new applications (plastics, crystals, glasses, lightweight materials, ceramics, carbides, UV optics materials)
- Material response to fabrication processes
- Metamaterials

## 2. Figuring and Finishing Science

- Grinding, precision grinding, diamond turning and milling, ultrasound assisted machining, vibration assisted polishing
- New ideas in traditional (pitch) polishing, MRF, ion beam figuring and polishing, jet polishing, novel finishing processes
- Glass and plastic molding
- Abrasives, novel abrasive formulations
- Thin films

## 3. Optical Testing

- Testing for sub-surface damage, homogeneity, form, finish, scratch/dig
- New ideas in interferometry
- Testing aspheric surfaces with and without null-optics
- Computer-generated holograms and spatial light modulators for testing
- Absolute tests for flats, spheres and aspheres
- New concepts in profilometry: optical and mechanical probes
- Testing of very large and very small optics
- White light interferometry, fringe projection metrology, deflectometry
- Testing in adverse environments: vibration, turbulence, vacuum, space, etc.
- In-process metrology

## 4. Assembly, Alignment, Contamination Control, Cleaning, Packaging

- Adhesives and cementing
- Alignment of optical systems
- Alignment of systems containing aspheric elements
- Alignment of multi-element mirrors
- Mounting, control of deformation and stress birefringence
- Cleaning optics
- Clean rooms and contamination control
- Handling and packing of precision optics

## 5. Process Engineering

- Cost effective optics manufacturing processes
- Cost effective fabrication of aspheric surfaces
- Automation in optics fabrication
- Fabrication of large optics
- Fabrication of micro-optics
- Experiences from the shop floor

## **6. Fabrication of Unusual Optical Systems**

- Photolithography optics
- Telescopes
- Adaptive optics
- Integrated optics

## **7. Education and Training in Optics Metrology and Finishing Science**

# Optical Fabrication and Testing Committee

## Applied Optics Committee

Jannick Rolland, *Univ. of Central Florida, USA*, **Co-Chair**

Chris Dainty, *Natl. Univ. of Ireland Galway, Ireland*

John Rogers, *Optical Res. Associates, USA*

Ozan Cakmakci, *Univ. of Central Florida, USA*

Leon Glebov, *Univ. of Central Florida, USA*

## Fabrication Committee

Stephen Jacobs, *Univ. of Rochester, USA* **Co-Chair**

Jessica DeGroot, *Optimax Systems, Inc., USA*

Kevin Moeggenborg, *Cabot Microelectronics Corp., USA*

James Oliver, *Univ. of Rochester, USA*

Markus Schinhärl, *Univ. of Applied Sciences Deggendorf, Germany*

David Strafford, *ITT Industries, USA*

Tayyab Suratwala, *Lawrence Livermore Natl. Lab, USA*

Kazuya Yamamura, *Osaka Univ., Japan*

Allen Yi, *Ohio State Univ., USA*

## Metrology Committee

Ulf Griesmann, *NIST, USA*, **Co-Chair**

Peter N. Blake, *NASA/GSFC, USA*

Seung-Woo Kim, *KAIST, Korea*

Thomas Milster, *Univ. of Arizona, USA*

Erik Novak, *Veeco Systems, USA*

Christof Pruss, *ITO, Univ. Stuttgart, Germany*

Rufino Diaz Uribe, *UNAM, Mexico*

Quandou Wang, *NIST, USA*

Jiawang Yan, *Tohoku Univ., Japan*

## Exhibitors

Please see <http://www.frontiersinoptics.com/ExhibitHall/default.aspx>.

## Special Events

### Dedication to Jean M. Bennett, 1930–2008

Optical Fabrication & Testing 2008 will dedicate its keynote session on *Mid-Spatial Frequencies and PSD*, a topic of increasing importance for the fabrication of precision optics, to the memory of Jean M. Bennett who passed away on July 18, 2008. Jean Bennett is well known for her work on surface roughness. She was a past OSA president and a long-time supporter of Optical Fabrication & Testing.

### Opening Session – NASA at 50 - a special symposium, co-sponsored with FiO's Subcommittee on Optical Design and Instrumentation.

It's been 50 years since the creation of NASA. The resulting extension of mankind's vision and presence into space has transformed our conception of the universe and of ourselves. This symposium celebrates the iconic achievements: the challenges, failures and discoveries that optical science and engineering have encountered in NASA's missions. In human exploration, astronomy and earth science, participants deeply involved in past and future missions will engage us with their stories, lessons and achievements in technology and science. Come hear science history, background tutorial, personal history and inspirational lessons; and get a glimpse of NASA's future.

Invited Speakers

Tuesday, October 21, 2008, 8:00 a.m.–10:00 a.m.

#### **The Hubble and Imaging**

STuA1, **Recovery of the Hubble: Discovery, Cause, Characterization and Mitigation of the Aberration**, *James B. Breckinridge; NASA, USA*

STuA2 , **Wavefront Sensing for Hubble Recovery**, *James R. Fienup; Inst. of Optics, Univ. of Rochester, USA*

STuA3 , **The Achievements of the Hubble Space Telescope**, *David S. Leckrone; NASA Goddard Space Flight Ctr., USA*

Tuesday, October 21, 2008, 10:30 a.m.–12:00 p.m.

#### **Future Telescopes**

STuB1, **Large Space Optics: From Hubble to JWST and Beyond**, *H. Philip Stahl; NASA, USA*

STuB2, **Sparse Aperture Space Telescopes, Interferometry and Astrometry**, *Michael Shao; JPL, USA*

STuB3, **NASA High Contrast Imaging for Exoplanets**, *Richard Lyon; NASA Goddard Space Flight Ctr., USA*

# OFT Invited Speakers

## Keynotes

OWA1, **KEYNOTE: Hartmann and Shack-Hartmann Tests, Applications and Recent Developments**, Daniel Malacara-Hernández, Armando Gómez-Vieyra; *Ctr. de Investigaciones en Optica AC, Mexico.*

OTThA1, **KEYNOTE: Development of Hot-Pressed and Chemical-Vapor-Deposited Zinc Sulfide and Zinc Selenide in the United States for Optical Windows**, Daniel Harris; *Naval Air Systems Command, USA.*

## Invited Speakers

OTuA1, **Specification and Control of Mid-Spatial Frequency Wavefront Errors in Optical Systems**, David Aikens<sup>1</sup>, Jessica E. DeGroot<sup>2</sup>, Richard N. Youngworth<sup>3</sup>; <sup>1</sup>Savvy Optics, USA, <sup>2</sup>Optimax Systems Inc., USA, <sup>3</sup>Light Capture Inc., USA.

OTuA2, **Calibration of Modulation Transfer Function of Surface Profilometers with 1-D and 2-D Binary Pseudo-Random Array Standards**, Valeriy Yashchuk<sup>1</sup>, Wayne R. McKinney<sup>1</sup>, Peter Z. Takacs<sup>2</sup>; <sup>1</sup>Lawrence Berkeley Natl. Lab, USA, <sup>2</sup>Brookhaven Natl. Lab, USA.

OTuA3, **Methods and Challenges in Quantifying Mid-Spatial Frequencies**, Paul Murphy; *QED Technologies, USA.*

OTuA4, **Measurement and Calibration of PSD with Phase-Shifting Interferometers**, John P. Lehan<sup>1,2</sup>; <sup>1</sup>NASA Goddard Space Flight Ctr., USA, <sup>2</sup>Univ. of Maryland, Baltimore County, USA.

OTuA5, **Characterization of Surface and Thin-Film Roughness Using PSD Functions**, Angela Duparré; *Fraunhofer Inst., Applied Optics and Precision Engineering, Germany.*

OTuA6, **Surface Artifacts in Manufacturing and Use of Large Imaging Optics**, Terrance J. Kessler; *Lab for Laser Energetics, Univ. of Rochester, USA.*

OTuB1, **Elliptical Vibration Cutting of Hard Mold Materials**, Eiji Shamoto, Norikazu Suzuki; *Nagoya Univ., Japan.*

OTuB2, **Ultrasonic Vibration Assisted Polishing of Micro Aspherical Molds**, Hirofumi Suzuki; *Chubu Univ., Japan.*

OTuB5, **Recent Trends in Precision Polymer Optics Fabrication**, William S. Beich, Loretta Fendrock, Chris Smock, Nicholas Turner; *G-S Plastic Optics, USA.*

OWB1, **On the Calibration of Diffractive Nulls for Transmission Tests of Aspheric Components**, Johannes Schwider, A. Berger, N. Lindlein, K. Mantel, I. Harder; *Inst. of Optics, Information and Photonics, Max Planck Res. Group, Germany.*

OWC1, **Progress in Laser-Induced Backside Wet Etching**, Hiroyuki Niino; *Photonics Res. Inst., Natl. Inst. of Advanced Industrial Science and Technology, Japan.*

OWD1, **Photonic Device Programs at the National Science Foundation**, Eric G. Johnson; *Natl. Science Foundation, USA.*

OTThA2, **Challenges in Optical Finishing of Reaction Bonded Silicon Carbide**, Joseph Robichaud; *L-3 Communication Systems, USA.*



**OThA3, Manufacturing High-Precision Optics for the Lawrence Livermore National Ignition Facility and Other International Laser Fusion Facilities** , *Roman Hachkowski; Zygo Corp., USA.*

**OThB1, Pseudo-Random Tool Paths for CNC Sub-Aperture Polishing and Other Applications** , *David D. Walker<sup>1,2</sup>, Christina R. Dunn<sup>1,3</sup>; <sup>1</sup>Univ. College London, UK, <sup>2</sup>Zeeko Ltd., UK, <sup>3</sup>Zeeko Technologies LLC., USA.*

**OThC6, Trends in Ultra-Precision Machining of Freeform Optical Surfaces**, *Yazid Tohme; Moore Nanotechnology Systems LLC, USA.*

**OThD1, Broad Ion-Beam Milling Techniques, Results and Prospects**, *Raymond Mercier, Michel Mullot, Michel Lamare; Inst. d'Optique Graduate School, Lab Charles Fabry, France.*

**OThD6, High-Speed Fabrication of Aspheres and Optical Free-Form Surfaces**, *Matthias Pfaff; OptoTech Optikmaschinen GmbH, Germany.*

**OFA1, CMP Slurry Design and Developments Related to New Materials**, *Rajiv K. Singh; Univ. of Florida, USA.*

**OFA6, Analysis of Shape, Pressures and Movements of Tools for an Accurate Control of Wearing in Classical Polishing**, *Alberto Cordero-Dávila; Benemérita Univ. Autónoma de Puebla, Mexico.*

**OFB1, "Design to Manufacture" from the Perspective of Optical Design and Fabrication**, *Alexander Eppel<sup>1</sup>, Hexin Wang<sup>2</sup>; <sup>1</sup>Carl Zeiss SMT AG, Germany, <sup>2</sup>Carl Zeiss AG, Germany.*

**OFB2, Optical Engineering of the OMEGA EP System for Petawatt Operation**, *Jack Kelly, R. Jungquist, L. J. Waxer, M. J. Guardalben, B. E. Kruschwitz, J. Qiao, I. A. Begishev, J. Bromage, C. Dorrer, J. L. Edwards, L. Folsbee, S. D. Jacobs, T. J. Kessler, R. W. Kidder, S. J. Loucks, J. R. Marciante, D. N. Maywar, R. L. McCrory, D. D. Meyerhofer, S. F. B. Morse, A. V. Okishev, J. B. Oliver, G. Pien, A. L. Rigatti, W. Schmid; Lab for Laser Energetics, Univ. of Rochester, USA.*

**This meeting was collocated with FiO/LS 2008.**

A consolidated program with all collocated meetings (FiO, LS, OF&T and META) is available with the FiO 2008 meeting archive and includes an agenda of sessions, abstracts, subject index, and key to authors and presiders.