

DONALD ALAN CHERNOFF  
Citizenship: U.S.A.

CURRICULUM VITAE August, 2014

Address:

Advanced Surface Microscopy, Inc.  
3250 N. Post Rd., Ste. 120  
Indianapolis, IN 46226 USA

Phone: (317) 895-5630, (800)-374-8557. Fax: (317) 895-5652. e-mail: donc@asmicro.com

POSITIONS HELD and MANAGEMENT EXPERIENCE

6/90- present: Advanced Surface Microscopy, Inc.: **President** of independent analytical and consulting laboratory providing research, analytical services, consultation and training for clients worldwide. ASM also sells calibration and test specimens, specialized calibration and measurement software, and buys, refurbishes, sells and installs used Atomic Force Microscopes.

7/88- 9/90: Roche Diagnostics (formerly Boehringer Mannheim Corp.), Research and Development:

- Project Engineer II: Responsible for the staffing and supervision of a 6-person medical instrument assessment group and a 4-person production group, including capital expenditures and purchases of statistical software. Earned "Superior Product Development" award (1989) for improvements to a manufacturing process (raised yield from 20% to 70% while improving quality).

9/80- 7/88: BP America (formerly Standard Oil (Ohio)) Corporate Research:

- 3/83- 7/88: Project Leader, Chemical Physics and Analytical Microscopy.
- 9/80-2/83: Senior Research Chemist, Chemical Physics.
- Responsible for the supervision of 1-2 student interns.
- Responsible for annual project proposals and capital expenditures for several major instruments (totaling over \$380,000 during seven years).

8/78-8/80: University of Pennsylvania, Chemistry Department: Postdoctoral research fellow.

TECHNICAL EXPERIENCE

Microscopy: Experienced research user of Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), Scanning Electron Microscope (SEM), and various optical microscopes. Research areas have included: invention of high precision feature measurement system using AFM, qualification and certification of high resolution pitch calibration standards for AFM and SEM, development of materials analysis applications of AFM phase imaging, surface structure of thin films, polished surfaces, and polymer fibers; microanalysis of bulk defects in ceramics; and application of optical microscopy to process improvement. We have published papers jointly written with senior scientists at NIST and in other National Metrology Centers worldwide. See #45 and #49 below.

Laser Spectroscopy and Optics: Experienced designer and research user of pulsed and continuous visible and ultraviolet lasers, monochromators and optical multichannel analyzers. Research areas have included photochemistry of proteins, energy transfer in isolated molecules, and low temperature studies of ceramics.

EDUCATION, HONORS and FELLOWSHIPS

Ph.D., Physical Chemistry, University of Chicago, August, 1978

B.S., Chemistry, University of Chicago, June, 1973. Awarded general honors,  
Phi Beta Kappa and Sigma Xi.

National Science Foundation Graduate Fellowship, 1973-1976

U. of Chicago Harkins Fellowship in Physical Chemistry, 1973-1974

National Science Foundation Postdoctoral Fellowship, 1979-1980.

AVS Shop Notes Prize for 2010 for paper (#47 below) on cleaning AFM standards.

## FEDERAL RESEARCH GRANTS and CONTRACTS

1992 - NIH SBIR Phase I award: "High Resolution Tools for Atomic Force Microscopy", \$50,000, April 15-December 5, 1992. Principal Investigator.

## PROFESSIONAL SOCIETIES and SERVICE

Member: American Physical Society; Sigma Xi; American Chemical Society; American Vacuum Society (AVS); Microscopy Society of America; ASTM International.

Referee: Journal of Chemical Physics; Chemical Physics; Journal of the American Chemical Society; Journal of Physical Chemistry; Journal of Vacuum Science and Technology; National Science Foundation; ACS Petroleum Research Fund. Conference Organizer: Pittcon, 2/88, co-organized symposium on Scanning Tunneling Microscopy. Member, ASTM E42.14 (subcommittee on STM and AFM standards).

## SELECTED SCIENTIFIC PUBLICATIONS by DONALD ALAN CHERNOFF

4. "Collision Induced Intramolecular Vibrational Energy Transfer in  $^1B_2$  Aniline," Donald A. Chernoff and Stuart A. Rice, J. Chem. Phys. **70**, 2521-2541 (1979).
7. "Geminate Recombination of  $O_2$  and Hemoglobin", D.A. Chernoff, R.M. Hochstrasser and A.W. Steele, Proc. Natl. Acad. Sci. (U.S.A.) **77**, 5606-5610 (1980).
14. "The Structure of Electronic Excited States in trans-Stilbene: Picosecond Transient Stokes and Anti-Stokes Raman Spectra", T.L. Gustafson, D.M. Roberts, and D. A. Chernoff, J. Chem. Phys. **81**, 3438-3443 (1984).
22. "Cathodoluminescence and Photoluminescence in Aluminum Nitride", R.A. Youngman, J.H. Harris, and D.A. Chernoff, Ceramic Transactions **5**, 399 (1989).
24. "Atomic Force Microscope Images of Collagen Fibers", Ellen A.G. Chernoff and Donald A. Chernoff, J. Vac. Sci. Technol. A **10**, 596 (1992).
30. "High Resolution Chemical Mapping Using Tapping Mode AFM with Phase Contrast", Donald A. Chernoff, Proceedings Microscopy and Microanalysis 1995, pp. 888.
37. "Automated, high precision measurement of critical dimensions using the Atomic Force Microscope", Donald A. Chernoff and David L. Burkhead, J. Vac. Sci. Technol. A **17**, 1457 (1999).
39. "Atomic Force Microscopy", Donald A. Chernoff and Sergei Magonov, chapter 19 in "Comprehensive Desk Reference of Polymer Characterization and Analysis", R. Brady, ed., Oxford University Press (2003).
41. "AFM Length Analysis of Data Marks: Measuring Jitter, Asymmetry, Process Noise and Process Position", Donald A. Chernoff and David L. Burkhead, in Optical Data Storage 2001, Terril Hurst, Seiji Kobayashi, Editors, Proceedings of SPIE vol. 4342, pp. 515-523 (2002).
44. "Analysis of Composite Surfaces with the Atomic Force Microscope: A Problem-Solving Approach", Donald A. Chernoff, in Surface Modification Technologies XV, ed. by T.S. Sudarshan and M. Jeandin, ASM International, 2002, pp.79-86.
45. "Picometer-scale accuracy in pitch metrology by optical diffraction and atomic force microscopy", Donald A. Chernoff, Egbert Buhr, David L. Burkhead, and Alexander Diener, in "Metrology, Inspection, and Process Control for Advanced Lithography XXII", edited by John Allgair, Proceedings of SPIE Vol. 6922, 2008. <http://spiedigitallibrary.org/> - Proc. SPIE 6922, 69223J (2008)
46. "Roadmap for Traceable Calibration of a 5-nm Pitch Length Standard", Donald A. Chernoff and David L. Burkhead, Proc. SPIE 7638, 763837 (2010).

47. "Resurrecting dirty atomic force microscopy calibration standards", Donald A. Chernoff and Robert Sherman, J. Vac. Sci. Technol. B 28, pp. 643-647 (May 2010). Permalink: <http://dx.doi.org/10.1116/1.3388847>

49. "Multilaboratory comparison of traceable atomic force microscope measurements of a 70 nm grating pitch standard", Ronald Dixson, Donald A. Chernoff, Shihua Wang, Theodore V. Vorburger, Siew Leng Tan, Ndubuisi Orji, Joseph Fu, J. Micro/Nanolith. MEMS MOEMS 10, 013015 (Mar 08, 2011); doi:10.1117/1.3549914  
Online Publication Date: Mar 08, 2011

50. "Traceable Pitch Metrology: Supporting the Development of Patterned Media and More", Donald A. Chernoff and David L. Burkhead, J. Micro/Nanolith. MEMS MOEMS 11, 011008 (Mar. 29, 2012); DOI: 10.1117/1.JMM.11.1.011008 [published online Mar. 29, 2012]

#### SELECTED PATENTS

1. "High precision calibration and feature measurement system for a scanning probe microscope", Donald A. Chernoff and Jason D. Lohr, U.S. Patent # 5,644,512, issued July 1, 1997.

#### MANUSCRIPTS AND ABSTRACTS SUBMITTED

#### TECHNICAL STANDARDS DOCUMENTS and other INDUSTRY SERVICE ACTIVITIES

1. ASTM E 2382-04 "Guide to Scanner and Tip Related Artifacts in Scanning Tunneling Microscopy and Atomic Force Microscopy", under jurisdiction of ASTM Committee E42 on Surface Analysis and direct responsibility of Subcommittee E42.14 on STM/AFM. Published by ASTM International. September 2004. [www.astm.org](http://www.astm.org). ASTM does not give authorship credit, however the major contributors to this document included: Don Chernoff, Greg Meyers, John Villarrubia and Yale Strausser.

2. Participated in the AFM portion of ASTM/NIST interlaboratory study ILS166. This was a study of particle size distribution in 3 NIST-supplied samples of gold nanoparticles. See ASTM Committee E56 on Nanotechnology, Subcommittee E56.02 on Characterization: Physical, Chemical, and Toxicological Properties, "Research Report E56-1001 Interlaboratory Study to Establish Precision Statements for ASTM E2490-09 Standard Guide for measurement of particle size distribution of nanomaterials suspension by photon correlation spectroscopy(PCS)" 4/1/2009.