Edwin (Dan) Daniel Hirleman
University of California, Merced
Uncategorized Department
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Research Interests

Laser/optical sensors and measurement methods for: surface defect and microfeature characterization; early detection of biohazards including chem/bio agents and food-borne pathogens; semiconductor manufacturing; combustion; and fluid mechanics. Global engineering education, cross-cultural global teams, and assessment.

Education

BS, With Distinction, Purdue University, 1972.
Major: Mechanical Engineering

MS, Purdue University, 1974.
Major: Mechanical Engineering

PhD, Purdue University, 1977.
Major: Mechanical Engineering

Professional Positions

Dean, School of Engineering, (2010 - Present).

Founding Director, GlobalHUB.org, Engineering Virtual Organization (NSF EVO). (2007 - Present).

Guest Professor, Shanghai Jiao Tong University, Mechanical Engineering Department. (2007 - Present).

Professor & William E. and Florence E. Perry Head, School of Mechanical Engineering. (2001 - Present).

Professor of Electrical and Computer Engineering, by courtesy, Purdue University. (1999 - Present).

Founding Director, Global Engineering Program, College of Engineering. (2005 - 2008).
Initial Interim appointment extended to three years.

Professor & Head, School of Mechanical Engineering. (1999 - 2001).

Associate Dean for Research, College of Engineering. (1995 - 1999).

Professor, Mechanical and Aerospace Engineering. (1988 - 1999).

Acting Chair, Mechanical and Aerospace Engineering Department. (1995).

Alexander von Humboldt Fellow, Institut fur Thermische Stromungsmaschinen. (1993).

Visiting Professor, Chemical Engineering Department. (1992).

Vice-Chair (Aerospace), Mechanical & Aerospace Engineering. (1989 - 1992).

Associate Professor, Mechanical and Aerospace Engineering. (1982 - 1987).

Assistant Professor, Mechanical and Aerospace Engineering. (1977 - 1981).

Teaching and Research Assistant, Mechanical Engineering. (1973 - 1977).

Engineering positions, Hughes Aircraft Company, Boeing Aircraft Co., Atlantic Richfield Research Labs. (1970 - 1977).
Six assignments, two years total

Visiting Researcher, Technical University of Denmark. (1974 - 1975).

Professional Memberships

Optical Society of America.

Society of Photo-Optical Instrumentation Engineers.

American Institute of Physics. (1997 - Present).

Awards and Honors

Cited in Who's Who in Frontier Science and Technology, American Men and Women of Science, Who's Who in American College and University Students.

Pi Tau Sigma.
Mechanical Engineering Honorary

Tau Beta Pi.
Engineering Honorary

Charles Russ Richards Memorial Award, Pi Tau Sigma (the National Mechanical Engineering Honor Society) and the American Society of Mechanical Engineers (ASME). (2009).
Presented annually to the engineering graduate who has demonstrated outstanding achievement in mechanical engineering twenty years or more following graduation

Delegate, U.S. Islamic World Forum. (2009).

Hon. George E. Brown, Jr. Award for International Scientific Cooperation, U.S. Civilian Research & Development Foundation (CRDF). (2008).
As the first engineer to receive this award, cited in recognition of outstanding commitment to international education and cooperative research.

Fellow, American Society of Mechanical Engineers (ASME). (2007).
Cited for Research & Development and Education

Achievement Award, International Network for Engineering Education and Research (iNEER). (2006).
Cited for development of programs for education of global engineers through comprehensive international experiences with international design team collaborations.

Team Award, Purdue College of Agriculture, for Biosensor Detection Team. (2006).
Additional participation from Electrical and Computer Engineering, Basic Medical Sciences, Veterinary Medicine, and Food Science

Team Excellence Award, College of Engineering. (2004).
For Global Engineering Alliance for Research and Education, with Foreign Languages & Literature in addition to Engineering

Alexander von Humboldt Fellow, Institut fur Thermische Stromungsmaschinen. (1993).

Governor's Recognition Award, Arizona State University Center for Solid State Electronics. (1993).

Associate Fellow, American Institute of Aeronautics and Astronautics. (1991).

Finalist, White House Fellowship, President's Commission on White House Fellows. (1987).

Professor of the Year, Mechanical Engineering Student Honor Society Pi Tau Sigma. (1982).

Significant Accomplishment in Research, College of Engineering. (1980).

National Science Foundation. (1973 - 1977).
Graduate Fellowship

Dean's Honor List, all semesters, Purdue University. (1969 - 1977).

Howard Hughes Doctoral Fellowship. (1974 - 1976).

Rhodes Scholar Nominee, Purdue University. (1972).

Lubrizol Foundation, Delta Tau Delta, and C.W. Davidson Scholarships, Purdue University. (1970 - 1972).

B.S.M.E. degree in three years Highest Distinction, 4.00 GPA, Purdue University. (May 1972).

RESEARCH

Published Intellectual Contributions

Books Edited

Hirleman, E. D., Bachalo, W. D., Felton, P. G. (Eds.), (1990). *Liquid Particle Size Measurement Techniques.* Philadelphia, PA, USA. American Society of Testing Materials. 0-8031-1459-1.

Conference/Workshop/Symposium Proceedings

Bai et al. (2010). Morphology Characterization of Bacterial Colonies for Predicting Forward Scattering Patterns. *Topical Meeting of Optical Society of America: Optical Sensors, 2010*, USA. Optical Society of America. (http://www.opticsinfobase.org/abstract.cfm?URI=Sensors-2010-STuC4).

Bai, N., Bae, E. W., Aroonnual, A., Bhunia, A. K., Robinson, J. P., Hirleman, E. D. (2009). Development of a Real-time System of Monitoring Bacterial Growth and Registering the Forward Scattering Pattern. In *Proceedings of SPIE.* Vol. 7315, (pp. 73150Z). USA. SPIE. ISSN: 0277-786X.

Dundar, M. M., Hirleman, E. D., Bhunia, A. K., Robinson, J. P., Rajwa, B. (2009). Learning with a Non-exhaustive Training Dataset. A Case Study: Detection of Bacteria Cultures using Optical-scattering Technology. In *Proceedings of the 15th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining.* (pp. 279-288). doi: 10.1145/1557019.1557055. (Paris, France).

Rajwa et al. (2009). Morphotypic Analysis and Classification of Bacteria and Bacterial Colonies using Laser Light Scattering, Pattern Recognition, and Machine-learning System. In *Proceedings of SPIE, 7306: 73061A.* Vol. 7306, (pp. 73061A). ISSN: 0277-786X.

Bae et al. (2009). Prediction of Light Scattering Patterns from Bacterial Colonies by a Time-resolved Reaction-diffusion Model and Scalar Diffraction Theory. In *Proceedings of SPIE, 7315.* Vol. 7315.

Atkinson, D. L., Chang, Y., Groll, E. A., Hirleman, E. D., Nauman, E. (2008). Coherence in Global Engineering Curriculum Design: Going Forward With What Works. In *Paper 243 in CD Proceedings of ASEE 7th Global Colloquium on Engineering Education. ASEE 7th Global Colloquium on Engineering Education*. (Capetown, South Africa).

Bae, E. W., Banada, P. P., Bhunia, A. K., Hirleman, E. D. (2008). Development and Optimization of Two-dimensional Centering Algorithm for the Bacteria Rapid Detection using Optical Scattering Technology (BARDOT) Platform. In *Proceedings of SPIE, 6849.*

Ouzzani et al. (2008). GlobalHUB: A Virtual Community for Global Engineering Education, Research, and Collaboration. In *Paper 245 in CD Proceedings of ASEE 7th Global Colloquium on Engineering Education. ASEE 7th Global Colloquium on Engineering Education*. (Capetown, South Africa).

Chang, Y., Atkinson, D. L., Hirleman, E. D. (2008). International Research and Engineering Education: Impact and Best Practices. In *Paper 228 in CD Proceedings. ASEE 7th Global Colloquium on Engineering Education*. (Capetown, South Africa).

Bae, E. W., Banada, P. P., Bhunia, A. K., Hirleman, E. D. (2008). Label-free Detection of Multiple Bacterial Pathogens using Light Scattering Sensor. *21st International Committee on Food Microbiology and Hygiene, P158*.

Rajwa et al. (2008). Phenotypic Analysis of Bacterial Colonies using Laser Light Scatter and Pattern-Recognition Techniques. In *Proceedings of SPIE 6864: 68640S-1-7.*

Rajwa et al. (2007). Automated Classification and Recognition of Bacterial Particles in Flow by Multi-angle Light Scattering and a Support Vector Machine Classifier. In D. L. Farkas, R. C. Leif, D. V. Nicolau (Eds.), *Paper 64410O in Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues V.*

O'Neill-Carrillo, E., Seijo, L., Maldonado, F., Hirleman, E. D., Marti, E., Rivera, A. (2007). Mentoring Interdiscplinary Service Learning Projects. *Frontiers in Education*, (pp. F4B-20 -- F4B-25).

Chiu, G., Groll, E. A., Hirleman, E. D. (2007). The Purdue Global Engineering Alliance for Research and Education (GEARE) Program. In *The Global Workforce: The Future of Technological Education (CD-ROM). ABET Annual Meeting 2007*.

Hirleman, E. D., Groll, E., Atkinson, D. (2007). The Three Axes of Engineering Education. In *Proceedings of International Conference on Engineering Education. ICEE*. (Coimbra, Portugal. https://globalhub.org/resources/73).

Groll, E. A., Hirleman, E. D. (2007). Undergraduate GEARE Program: Purdue University's School of ME Contribution to Educating Globally Sensitive and Competent Engineers. In *Conference Proceedings (CD-ROM). 6th ASEE Global Colloquium on Engineering Education*. (Istanbul, Turkey).

Bayraktar, B., Banada, P. P., Hirleman, E. D., Bhunia, A. K., Robinson, J. P., Rajwa, B. (2006). Bacterial phenotype identification using Zernike moment invariants. In *Proceedings of the Photo-Optical Instrumentation Engineers.* Vol. 6080, (pp. 155-162).

Adelstein, B. D., Traylor, R., Tan, H., Hirleman, E. D. (2006). Discrimination of Real and Virtual High Definition Textured Surfaces. *Haptics Symposium*. (Arlington, VA).

Groll, E. A., Krousgrill, C. M., Meckl, P.q, Hirleman, E. D. (2006). Experiences with multinational and multi-semester design team projects. In *Paper 1016 (CD). Frontiers in Education 2006*.

Hirleman et al. (2006). Global Engineering Education via Integrated Study and Work Abroad. In *Proceedings of International Conference on Engineering Education.* ICEE.

Venkatapathi, M., Gregori, G., Robinson, J. P., Hirleman, E. D. (2005). Measuring Size using Forward Light Scattering is not Straight-Forward. *XXIII International Congress of the International Society for Analytical Cytology*.

Rajwa, B., Bayraktar, B., Banada, P. P., Robinson, J. P., Bhunia, A. K., Hirleman, E. D. (2005). Noninvasive Forward-scattering System for Rapid Detection, Characterization, and Identification of Listeria colonies. Image-processing and Analysis. *XXIII International Congress of the International Society for Analytical Cytology*.

Hirleman et al. (2004). GEARE: A Comprehensive Program for Globalizing Engineering Education. In *Paper 2004-1195, 10 pages, Proceedings of the 2004 American Society for Engineering Education Annual Conference.*

Nebeker, B. M., Buckner, B. D., Hirleman, E. D., Lathrop, A., Bhunia, A. K. (2001). Identification and characterization of bacteria on surfaces using light-scattering. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers.* Vol. 4206, (pp. 224-234).

Diaz, R. E., Nebeker, B. M., Hirleman, E. D. (2001). On-Wafer Measurement of Particles: Methods of measuring particles on a wafer surface; off-line/at-line technology; in situ methods. In R. Donovan (Ed.), *Contamination Free Manufacturing for Semiconductors And Other Precision Products.* (pp. 79-116). Marcel-Dekker.

Jordan, M., Diaz, R. E., Hirleman, E. D. (2000). Analytical , first-order model of light scattering from submicron pyramidal pits. In *Paper LA10-17 in Metrology-Based Control for Micro Manufacturing, Proceedings of SPIE.* Vol. LA10, Bellingham, WA, USA. SPIE International.

Nebeker, B. M., Hirleman, E. D. (1999). Light Scattering by Particles and Defects on Surfaces: Semiconductor Wafer Inspection. In F. Moreno, F. Gonzalez (Eds.), *Laredo Workshop on Light Scattering from Microstructures - Lectures of the Summer School of Laredo.* (pp. 229-244). (University of Cantabria, Laredo, Spain).

Suresh, L., Walz, J. Y., Hirleman, E. D. (1998). Detection of Particles on Surfaces using Evanescent Wave Scattering. In K. L. Mittal (Ed.), *Particles on Surfaces V and VI.* (pp. 19-34). (Fine Particle Society).

Muhlenweg, H., Hirleman, E. D. (1998). Diffraction by Nonspherical Particles. In L. Leschonski (Ed.), *Proceedings of the 8th European Symposium on Particle Characterization.* (pp. 655-671). (Nurnberg Messe Gmbh, Nurnberg, Federal Republic of Germany).

Muhlenweg, H., Hirleman, E. D. (1998). Irregularly-shaped Particles Measured by Laser Diffraction Spectroscopy. In *Proceedings of the Fifth International Congress on Optical Particle Sizing.* (pp. 147-150). (University of Minnesota, Minneapolis, MN).

Starr, G. W., Hirleman, E. D. (1998). Light Scattering by Particles on Patterned Wafers. In *Proceedings of the Fifth International Congress on Optical Particle Sizing.* (pp. 65-68). (University of Minnesota, Minneapolis, MN).

Buckner, B., Hirleman, E. D. (1998). Surface Particle Detection for the 70 nm generation and beyond. In J. Stover (Ed.), *Flatness, Roughness, and Discrete Defects Characterization for Computer Disks, Wafers, and Flat Panel Displays II.* Vol. 3275, (pp. 90-101). Bellingham, WA, USA. SPIE.

Weber, C., Jensen, D., Hirleman, E. D. (1998). What Drives Defect Detection Technology?. In *Micro.*

Ding, P., Starr, G. W., Chowdhury, R., Hirleman, E. D. (1997). Defect Characterization and Light Scattering by PSL Spheres on Tungsten CMP Wafers. In *In-line Characterization Techniques for Performance and Yield Enhancement in Microelectronic Manufacturing.* Vol. 3215, (pp. 50-60). Bellingham, WA, USA. SPIE.

Nebeker, B. M., Starr, G. W., Hirleman, E. D. (1997). Modeling of Scattered Light from Circuit Features and Contaminant Particles using the Discrete-dipole Approximation. In Y. Eremin, T. Wriedt (Eds.), *Proceedings, Electromagnetic and Light Scattering: Workshop '97.* (pp. 19-21). (Moscow Lomonosov State University, Moscow).

Nebeker, B. M., Starr, G. W., Hirleman, E. D. (1997). Modeling of Scattering from Arbitrarily-Shaped Features and Particles on Surfaces Using the Discrete-Dipole Approximation. In K. Lumme, J. W. Hovenier, K. Muinonen, J. Rahola, H. Laitinen (Eds.), *Proceedings of the Workshop on Light Scattering by Non-Spherical Particles.* (pp. 41-42). (University of Helsinki).

Starr, G. W., Hirleman, E. D. (1996). Comparison of Experimentally-Measured Differential Scattering Cross Sections of PSL Spheres on Flat and Patterned Surfaces. In J. Stover (Ed.), *Flatness, Roughness, and Discrete Defect Characterization for Computer Disks, Wafers, and Flat Panel Displays.* Vol. 2862, (pp. 130-138). Bellingham, WA, USA. SPIE.

Nebeker, B. M., Starr, G. W., Hirleman, E. D. (1996). Effect of Adjacent Particles and Defects on Light Scattering by Surface Microfeatures. In T. Wriedt, M. Quinten, K. Bauckhage (Eds.), *Electromagnetic and Light Scattering - Theory and Applications.* (pp. 119-122). (Universitat Bremen, Bremen, Federal Republic of Germany).

Nebeker, B. M., Starr, G. W., Hirleman, E. D. (1996). Modeling of Light Scattering from Structures with Particle Contaminants. In J. Stover (Ed.), *Flatness, Roughness, and*

Discrete Defect Characterization for Computer Disks, Wafers, and Flat Panel Displays. Vol. 2862, (pp. 139-150). Bellingham, WA, USA. SPIE.

Schmittinger, S. K., Hirleman, E. D. (1996). Non-ablative Removal of Surface Particles with a Pulsed Laser Beam. In T. C. Ward (Ed.), *Proceedings of the 19th Annual Meeting of the Adhesion Society. 19th Annual Meeting of the Adhesion Society*, (pp. 501-504). ISSN: 1086-9506. (The Adhesion Society, Myrtle Beach, SC).

Nebeker, B. M., Schmehl, R., Starr, G. W., Hirleman, E. D. (1996). Prediction of Light Scattering Characteristics of Particles and Structures on Surfaces by the Coupled-dipole Method. In S. Jones (Ed.), *Metrology, Inspection, and Process Control for Microlithography X.* Vol. 2725, (pp. 690-697). Bellingham, WA, USA. SPIE.

Schmehl, R., Hirleman, E. D., Wittig, S. L. K. (1996). The Coupled-Dipole Method for Light Scattering by Particles on Plane Surfaces. In T. Wriedt, M. Quinten, K. Bauckhage (Eds.), *Electromagnetic and Light Scattering - Theory and Applications.* (pp. 123-126). (Universitat Bremen, Bremen, Federal Republic of Germany).

Warner, T. L., Hirleman, E. D. (1996). Toward Classification of Particle Properties Using Light Scattering Techniques. In *Proceedings of the Institute of Environmental Sciences.* (Orlando, FL).

Heffels, C., Heitzmann, D., Hirleman, E. D., Scarlett, B. (1995). Efficient Calculation of Scatter Patterns of Sharp-edged Crystals in the Fraunhofer and Anomalous Diffraction Approximations. In *Proceedings of the 4th International Congress on Optical Particle Sizing.* (pp. 439-448). (Nurnberg Messe GmbH, Nurnberg, Federal Republic of Germany).

Hirleman, E. D. (1995). History of the Phase-Doppler Sizing Anemometer. In *Proceedings of the 20th Anniversary of Phase Doppler Anemometry.* (pp. 1-10). (Lehrstuhl fur Stromungsmechanik, Universitat Erlangen-Nurnberg, Federal Republic of Germany).

Nebeker, B. M., Starr, G., Hirleman, E. D. (1995). Light Scattering from Patterned Surfaces and Particles on Surfaces. In J. K. Lowell, R. T. Chen, J. P. Mathur (Eds.), *Optical Characterization Techniques for High Performance Microelectronic Device Manufacturing II*, Bellingham, WA, USA. SPIE.

Huff et al. (1995). Measurement of Silicon Particles by Laser Surface Scanning and Angle-resolved Light Scattering. In et al. *Proceedings of ECS Meeting.* (San Jose, CA).

Warner, T., Hirleman, E. D., Bawolek, E. J. (1994). Characteristics of Light Scattering Signatures of Various Particle Types on Wafer Surfaces. In *Particles, Haze, and Microroughness on Silicon Wafers.* (pp. 165-183). (Presentation Summary, Semiconductor Equipment and Materials International, Mt. View, CA).

Hirleman, E. D. (1994). Correlation of Surface Statistics by Atomic Force Microscopy and Angle-resolved Scattering from Semiconductor Substrates. In *Workshop Summary Report: Industrial Applications of Scanned Probe Microscopy.* (pp. 48-49). Gaithersburg, MD: NIST.

Willmann, M., Kneer, R., Eigenmann, L., Koch, R., Wittig, S., Hirleman, E. D. (1994). Experimental Investigations of the Effect of Trajectory-dependent Scattering on Phase-Doppler Particle Sizing. In *Proceedings of the 7th International Conference on Laser Velocimetry.* (Lisbon).

Huff et al. (1994). Measurement of Silicon Particles by Laser Surface Scanning and Angle-resolved Light Scattering. In *Proceedings of Microcontamination 1994 Conference.* (San Jose, CA).

Kneer, R., Wittig, S., Schneider, M., Hirleman, E. D. (1994). Phase-Doppler Analysis of Multicomponent Evaporating Droplets. In *Proceedings of the Sixth International Conference on Liquid Atomization and Spray Systems.* (pp. 451-458). (Rouen, France).

Hirleman, E. D. (1993). Light Scattering by Particles on Surfaces. In M. Maeda (Ed.), *Proceedings of the Third International Congress on Optical Particle Sizing.* (pp. 1-8). (Keio University, Yokohama, Japan).

Schneider, M., Hirleman, E. D., Saleheen, H. I., Chowdhury, D. Q., Hill, S. C. (1993). Light Scattering by Radially Inhomogeneous Fuel Droplets in a High Temperature Environment. In L. Liou (Ed.), *Laser Applications in Combustion and Combustion Diagnostics, SPIE 1862.* (pp. 269-286). Bellingham, WA, USA. Society for Photo-optical Instrumentation Engineers.

Schneider, M., Hirleman, E. D., Saleheen, H. I., Chowdhury, D. Q., Hill, S. C. (1993). Rainbows and Radially-inhomogeneous Droplets. In M. Maeda (Ed.), *Proceedings of the Third International Congress on Optical Particle Sizing.* (pp. 323-326). (Keio University, Yokohama, Japan).

Heffels, C., Heitzmann, D., Hirleman, E. D., Kramer, H. J. M., Scarlett, B. (1993). Use of Azimuthal variations in Laser Diffraction Patterns for Particle Shape Characterization. In M. Maeda (Ed.), *Proceedings of the Third International Congress on Optical Particle Sizing.* (pp. 23-28). (Keio University, Yokohama, Japan).

Bossard, J. A., Somashekara, M. B., Peck, R. E., Hirleman, E. D. (1992). Characterization of Simplex Atomizer Sprays in Axisymmetric, Swirling Combustor Flows. In M. Afghan (Ed.), *Proceedings of the Eighth European Conference on Liquid Atomization and Spray Systems.* (pp. 131-138). (Koninklijke/Shell Laboratorium, Amsterdam).

Bawolek, E. J., Vaughan, D. K., Hirleman, E. D. (1992). Computational and Experimental Study of Light Scattering by 0.364 by @m Spheres on Si and SiO2. In *Proceedings of the First International Symposium on Ultra Clean Processing of Silicon Surfaces.* (pp. 33-34). (University of Leuven, Belgium).

Bawolek, E. J., Mohr, J. B., Hirleman, E. D., Majumdar, A. (1992). Light Scatter from Polysilicon and Aluminum Surfaces and Comparison with Roughness Statistics by Atomic Force Microscopy. In *Surface Roughness and Scattering Technical Digest: Post Deadline Papers.* Vol. 14, (pp. 3-6). Washington, D.C., USA. Optical Society of America.

Bawolek, E. J., Hirleman, E. D. (1992). Light Scattering by Sub-Half Micron Spherical Particles on Silicon and Oxide/Silicon Surfaces. In *Surface Roughness and Scattering Technical Digest: Post Deadline Papers.* Vol. 14, (pp. 7-10). Washington, D.C., USA. Optical Society of America.

Bawolek, E. J., Hirleman, E. D. (1992). Light Scattering by Sub-Half Micron Spherical Particles on Silicon and Oxidized Silicon Surfaces. In T. Waring (Ed.), *The Future Practice of Contamination Control.* (pp. 485-491). London, U.K.. Mechanical Engineering Publications, Ltd..

Hirleman, E. D., Felton, P. G., Kennedy, J. (1992). The Status of U.S. Efforts Toward Calibration Standardization for Laser Diffraction Instruments. In K. Leschonski (Ed.), *Proceedings of the 5th European Symposium on Particle Characterization.* (pp. 655-671). (Nurnberg Messe Gmbh, Nurnberg, Federal Republic of Germany).

Kenney, S. B., Hirleman, E. D. (1991). Calibration Factors for Laser Diffraction Ring Detectors: Theoretical Modeling. In *Proceedings of the Fifth International Conference on Liquid Atomization and Spray Systems (ICLASS-91).* (pp. 415-422). Washington, D.C., USA. U.S. Government Printing Office. (National Institute of Standards and Technology (NIST) Special Publication 813).

Kenney, S. B., Hirleman, E. D. (1991). Edge Effects in Silicon Photodiode Arrays. In P. Dean (Ed.), *Sensors and Sensor Integration, Proceedings of SPIE 1480.* (pp. 82-93). Bellingham, WA, USA. SPIE.

Bawolek, E. J., Hirleman, E. D. (1991). Light Scattering by Submicron Spherical Particles on Semiconductor Surfaces. In K. Mittal (Ed.), *Particle on Surfaces.* (pp. 91-105). New York, USA. Plenum Publishing Co..

Hirleman, E. D., Felton, P. G., Kennedy, J. (1991). Results of the ASTM Interlaboratory Study on Calibration Verification of Laser Diffraction Particle Sizing Instruments using Photomask Reticles. In *Proceedings of the Fifth International Conference on Liquid Atomization and Spray Systems (ICLASS-91).* (pp. 611-620). Washington, D.C., USA. U.S. Government Printing Office. (National Institute of Standards and Technology (NIST) Special Publication 813).

Ward, M. J., Bossard, J. A., Peck, R. E., Hirleman, E. D. (1991). Spray Characterization in Axisymmetric, Swirling Combustor Flows. In *Proceedings of the Fifth International Conference on Liquid Atomization and Spray Systems (ICLASS-91).* (pp. 529-538). Washington, D.C., USA. U.S. Government Printing Office. (National Institute of Standards and Technology (NIST) Special Pub. 813).

Bawolek, E. J., Hirleman, E. D. (1991). Surface Roughness Effects on Light Scattered by Submicron Particles on Surfaces. In W. H. Arnold (Ed.), *Integrated Circuit Metrology: Inspection and Process Control V, Proceedings of SPIE 1464.* (pp. 574-583). Bellingham, WA, USA. SPIE.

Kenney, S. B., Hirleman, E. D. (1990). A General Solution to the Inverse Near-Forward Scattering Particle Sizing Problem in Multiple Scattering Environments: Experiments. In *Proceedings of the 2nd International Congress on Optical Particle Sizing, Post-Deadline Papers Addendum.* (pp. 27-30). (Arizona State University, Tempe, AZ).

Hirleman, E. D. (1990). A General Solution to the Inverse Near-Forward Scattering Particle Sizing Problem in Multiple Scattering Environments: Theory. In *Proceedings of the 2nd International Congress on Optical Particle Sizing.* (pp. 159-168). (Arizona State University, Tempe, AZ).

Koo, J. H., Hirleman, E. D. (1990). A Synthesis of Integral Transform Techniques for Reconstruction of Particle Size Distributions from Forward-scattered Light. In *Proceedings of the 2nd International Congress on Optical Particle Sizing.* (pp. 189-198). (Arizona State University, Tempe, AZ).

Koo, J. H., Hirleman, E. D. (1990). Critical factors for Particle Size Reconstruction using Integral Transform Solutions. In *Paper AIAA-91-0180. AIAA 29th Aerospace Sciences Meeting*, New York, USA. AIAA. (Reno, NV).

McNeill, B. W., Hirleman, E. D., Bridenstine, D. A. (1990). Design Metrics: Measures of the Design State. In *Proceedings of the NSF Design and Manufacturing Systems Conference.* (pp. 137-139). Society of Manufacturing Engineers. (Dearborn, MI).

Bawolek, E. J., Hirleman, E. D. (1990). Light Scattering by Submicron Spherical Particles on Semiconductor Surfaces. In *21st Annual Meeting of the Fine Particle Society.* (San Diego, CA).

Hirleman, E. D. (1990). Noncontact Characterization of Submicron Surface Features using Light Scattering. In *Proceedings of the NSF Design and Manufacturing Systems Conference.* (pp. 191-195). Society of Manufacturing Engineers. (Dearborn, MI).

Kenney, S. B., Hirleman, E. D. (1990). Particle Sizing Errors Associated with the Fraunhofer Diffraction Assumption in the Anomalous Diffraction Regime. In *Proceedings of the 2nd International Congress on Optical Particle Sizing, Post-Deadline Papers Addendum.* (pp. 23-26). (Arizona State University, Tempe, AZ).

Kenney, S. B., Hirleman, E. D. (1990). Particle Sizing Errors Associated with the Fraunhofer Diffraction Assumption in the Anomalous Diffraction Regime. In *Proceedings of the 4th Annual Conference on Liquid Atomization and Spraying Systems.* (pp. 17-21). (United Technologies Research Center, E. Hartford, CT).

Parsons, S. B., Bruner, A., Hirleman, E. D., Peck, R. E. (1990). Response Characteristics and Calibration Results for the Aerometrics Phase-Doppler Particle Analyzer. In *Proceedings of the 4th Annual Conference on Liquid Atomization and Spraying Systems.* (pp. 22-26). (United Technologies Research Center, E. Hartford, CT).

Koo, J. H., Kneer, M. J., Chaboki, A., Hirleman, E. D. (1990). Statistical Approach to Evaluate Particle Size Inversion Algorithms. In *Paper A1AA-90-0151. A1AA 28th Aerospace Sciences Meeting*, New York, USA. A1AA. (Reno, NV).

Bawolek, E. J., Hirleman, E. D. (1990). Studies in Contamination Detection: Light Scattering by Submicron Particles on Surfaces. In *Techon '90 Proceedings.* (pp. 259-262). (Semiconductor Research Corporation, Research Triangle Park, NC).

Koury, E. P., Hirleman, E. D. (1989). A Simulation of Machine Vision Optical Inspection for use in Design for Inspectability. In *Concurrent Product and Process Design.* Vol. DE-Vol. 21, (pp. 73-78). New York, USA. American Society of Mechanical Engineers.

McNeill, B. W., Bridenstine, D. A., Hirleman, E. D., Davis, F. (1989). Design Process Test Bed. In *Concurrent Product and Process Design.* Vol. DE-Vol. 21, (pp. 117-120). New York, USA. American Society of Mechanical Engineers.

Hirleman, E. D. (1989). Optimal Scaling of the Inverse Fraunhofer Diffraction Particle Sizing Problem: Analytic Eigenfunction Expansions. In *Proceedings of the 4th European Symposium on Particle Characterization.* (pp. 339-346). (Nurnberg, West Germany).

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Hirleman, E. D., "Multiple Scattering and Laser Diffraction Particle Sizing," Institut fur Werkstoffstechnik, Universitat Bremen, Federal Republic of Germany. (June 1993).

Hirleman, E. D., "Optics of Droplets with Radial Refractive Index Variations," Institut fur Thermodynamik, Universitat Stuttgart, Stuttgart, Federal Republic of Germany. (June 1993).

Hirleman, E. D., "Light Scattering by Particles on Semiconductor Surfaces," Electrical Engineering Department, Universitat Duisburg, Duisburg, Federal Republic of Germany. (March 1993).

Hirleman, E. D., "Characterization of Surface Defects by Light Scattering," Wacker, Chemitronics GmbH, Burghausen, Federal Republic of Germany. (February 1993).

Hirleman, E. D., "Fundamental Calibration Techniques for Laser Diffraction Methods," Dutch Particle Characterization Working Group, Delft, Netherlands. (January 1993).

Hirleman, E. D., "Multiple Scattering Effects in Optical Particle Sizing," Chemical Engineering Department, Technical University of Delft, Delft, Netherlands. (October 1992).

Hirleman, E. D., European Aerosol Conference, Christ Church, Oxford, United Kingdom. Particle Characterization Workshop. (September 1992).

Hirleman, E. D., European Aerosol Conference, "U.S. Efforts on Calibration of Laser Diffractometers," Christ Church, Oxford, United Kingdom. Particle Standards Workshop. (September 1992).

Hirleman, E. D., "Light Scattering by Particles on Semiconductor Surfaces," Sharp Corp. Research of Europe, Ltd., Oxford, United Kingdom. (September 1992).

Hirleman, E. D., Atomization and Sprays 2000, "Optical Diagnostics," National Science Foundation, Gaithersburg, MD. (July 1991).

Hirleman, E. D., "Characterization of Particles on Surfaces using Light Scattering," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., "Ensemble Particle Sizing using Near-forward Scattered Light Signatures," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., "Laser Techniques for Simultaneous Particle Size and Velocity Measurements," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., "Multiple Scattering and the Fraunhofer Diffraction Particle Sizing Problem," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., "Particle Diagnostics using Optical Techniques: Introduction," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., "Single Particle Sizing using Scattered Light," Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota. (May 1991).

Hirleman, E. D., Mechanical Engineering Department Seminar, "On the Inverse Fraunhofer Diffraction Particle Sizing Problem," Purdue University, W. Lafayette, Indiana. (October 1990).

Hirleman, E. D., Fine Particle Society Annual Meeting, "Calibration Verification of Laser Diffraction Particle Sizing Instruments using Photomask Reticles," Panel: Pending Standards and their Impact on the Fine Particle Industry, San Diego, CA. (August 1990).

Hirleman, E. D., "Phase-Doppler Particle Analyzer: Performance Characterization and Measurements in Sprays," Technion - Israeli Institute of Technology, Aerospace Engineering Department. (July 1990).

Hirleman, E. D., "Multiple Scattering and the Fraunhofer Diffraction Particle Sizing Problem," Pittsburgh Energy Technology Center, U.S. Department of Energy, Pittsburgh, PA. (May 1990).

Hirleman, E. D., "Research Needs for Microfeature Characterization in the Semiconductor Industry," Bipolar and Semiconductor Product Division, Motorola, Inc., Mesa, AZ. (June 1989).

Hirleman, E. D., "On the Fraunhofer Diffraction Particle Sizing Problem," Department of Information Technology, Riso National Laboratory, Roskilde, Denmark. (April 1989).

Hirleman, E. D., "The use of Near-forward Light Scattering Signatures in Determination of Particle Size Distributions," Measurements Department, Institut Franco-Allemand de Recherches de Saint-Louis (ISL), Saint-Louis, France. (April 1989).

Hirleman, E. D., "Particle Size and Velocity Diagnostics for Plasma Sprays," Motoren und Turbinen Union, Daimler-Benz, Munich, Federal Republic of Germany. (July 1988).

Hirleman, E. D., "Particle Sizing by Light Scattering," Institute of Physics, Technical University of Budapest, Budapest. (July 1988).

Hirleman, E. D., "On the Inverse Fraunhofer Diffraction Particle Sizing Problem," Institut fur Thermodynamik, Universitat Stuttgart, Stuttgart, Federal Republic of Germany. (June 1988).

Hirleman, E. D., "On the Inverse Fraunhofer Diffraction Particle Sizing Problem," Institute of Fluid Flow Machines, Polish Academy of Sciences, Gdansk, Poland. (June 1988).

Hirleman, E. D., "Surface Microfeature Characterization using Laser Light Scattering," Mechanical Engineering Department, University of North Carolina, Charlotte, NC. (April 1988).

Hirleman, E. D., Factory Automation Group, "Research Needs for Optical Inspection in the Electronics Industry," Intel Corporation, Chandler, AZ. (November 1987).

Hirleman, E. D., Dellenback, P. A., Seventh International Congress on Lasers and Electro-optics, "Faraday-effect Light Valve Arrays for Adaptive Optical Instruments," San Diego, CA. (November 1987).

Hirleman, E. D., Seventh International Congress on Lasers and Electro-optics, "Faraday-effect Light Valve Arrays for Adaptive Optical Instruments," San Diego, CA. (November 1987).

Hirleman, E. D., Project WIND Dispersion Workshop, "Droplet Size Measurement Methods," U.S. Department of Agriculture and U.S. Army, Kalispell, MT. (August 1987).

Hirleman, E. D., "A Review of Optical Particle Sizing Techniques," Chemical Process Metrology Division, National Bureau of Standards, Washington, D.C.. (June 1987).

Hirleman, E. D., "Surface Characterization using Laser Light Scattering," Mechanical Engineering Department Seminar, University of Washington, Seattle, Washington. (April 1987).

Hirleman, E. D., Sixth International Congress on Lasers and Electro-optics, "Laser Diffraction Particle Sizing Techniques," Washington, D.C.. (November 1986).

Hirleman, E. D., Sixth International Congress on lasers and Electro-optics, "Laser Diffraction Particle Sizing Techniques," Washington, D.C.. (November 1986).

Hirleman, E. D., "Surface Defect Characterization using Optical Scattering," Mechanical Engineering Department, University of California, Irvine, Irvine, California. (October 1986).

Hirleman, E. D., "Calibration Methods for Laser Diffraction Instruments," Energy Systems Laboratory, University of Rouen, Rouen, France. (July 1984).

Hirleman, E. D., "Fast Inverse Scattering Algorithms," Compagnie Industrielle des Lasers, Marcoussis, France. (July 1984).

Hirleman, E. D., "Laser Technique for Simultaneous Particle Size and Velocity Measurements," Mechanical Engineering Department, Imperial College, London, United Kingdom. (July 1984).

Hirleman, E. D., "Recent Developments in Laser Diffraction Particle Sizing," Chemical Engineering Department, University of Sheffield, Sheffield, United Kingdom. (July 1984).

Hirleman, E. D., "Recent Developments in Laser Diffraction Particle Sizing," Shell-Thornton Research Center, Chester, United Kingdom. (July 1984).

Hirleman, E. D., "The Laser Diffraction Droplet Sizing Technique," Institut fur Thermische Stromungsmaschinen, Universitat Karlsruhe, Karlsruhe, Federal Republic of Germany. (July 1984).

Hirleman, E. D., ASTM Conference on Sizing Liquid Particles, "Particle Sizing by Optical, Nonimaging Techniques," Kansas City, Kansas. (June 1984).

Hirleman, E. D., ASTM Conference on Sizing Liquid Particles, "Particle Sizing by Optical, Nonimaging Techniques," Kansas City, KS. (June 1984).

Hirleman, E. D., "Non-Doppler Laser Velocimetry Technique," Energy Systems Division, Southwest Research Institute, San Antonio, Texas. (February 1984).

Hirleman, E. D., "The Laser-two-Focus Velocimeter," Mechanical Engineering Department, University of Houston, Houston, Texas. (February 1984).

Hirleman, E. D., "Droplet Size Distribution Measurements in Sprays," Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Laser Diffraction Particle Sizing Techniques," Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Laser Diffraction Particle Sizing Techniques," Institute of Mechanics, Chinese Academy of Sciences, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Light Scattering by Particles," Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Microcomputer-based Data Acquisition and Processing," Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Multiple ratio Single Particle Counter," Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China. (October 1983).

Hirleman, E. D., "Laser Light Scattering Methods for Aerosol Characterization," Mechanical Engineering Department, University of Nebraska, Lincoln, Nebraska. (September 1983).

Hirleman, E. D., AIAA 18th Thermophysics Conference, "Nonintrusive Laser Particle Sizing Techniques," Montreal, Canada. AIAA-83-1514. (June 1983).

Hirleman, E. D., A1AA 18th Thermophysics Conference, "Nonintrusive Laser Particle Sizing Techniques," Montreal, Canada. A1AA-83-1514. (June 1983).

Hirleman, E. D., "Laser-based Particle Sizing Techniques," Department of Energy Workshop on Coal Combustion, Pittsburgh, PA. (June 1982).

Hirleman, E. D., Lecture at the Department of Energy Workshop on Coal Combustion, "Laser-based Particle Sizing Techniques," Pittsburgh, PA. (June 1982).

Hirleman, E. D., Annual Conference of the Aerosol Research Association, "Laser-based Single Particle Counters in In-Situ Particulate Diagnostics," Santa Monica, CA. (February 1982).

Hirleman, E. D., Annual Conference of the Aerosol Research Association, "Laser-based Single Particle Counters in In-Situ Particulate Diagnostics," Santa Monica, CA. (February 1982).

Hirleman, E. D., "Laser Diffraction Particle Sizing Techniques," Aerospace and Mechanical Engineering Department, University of Arizona, Tucson, Arizona. (January 1982).

Hirleman, E. D., "Laser Light Scattering Methods for Particle Sizing," Society for Instrumentation and Control of Energy Processes Symposium, Livermore, CA. (April 1981).

Hirleman, E. D., Society for Instrumentation and Control of Energy Processes Symposium, "Laser Light Scattering Methods for Particle Sizing," Livermore, CA. (April 1981).

Hirleman, E. D., "Optical Scattering Particle Sizing Techniques," Nuclear Engineering Department, Kansas State University, Manhattan, Kansas. (December 1978).

Hirleman, E. D., "Laser Light Scattering Particle Sizing Techniques," Atomic Energy Research Establishment, Harwell, Oxfordshire, United Kingdom. (August 1978).

Hirleman, E. D., "Laser Technique for Simultaneous Particle Size and Velocity Measurements," Institute for Fluid Mechanics, Technical University of Denmark, Lyngby, Denmark. (August 1978).

Hirleman, E. D., "Laser Technique for Simultaneous Particle Size and Velocity Measurements," National Gas Turbine Research Establishment, Farnborough, United Kingdom. (August 1978).

Hirleman, E. D., "THe Multiple Ratio Single Particle Counter," The Combustion Research Facility, Sandia National Laboratories, Livermore, CA. (April 1977).

Hirleman, E. D., "The Multiple Ratio Single Particle Counter," Mechanical Engineering Department Seminar, Purdue University, W. Lafayette, Indiana. (January 1976).

Hirleman, E. D., "The Multiple Ratio Single Particle Counter," Laboratory for Energiteknik, Technical University of Denmark, Lyngby, Denmark. (May 1975).

Hirleman, E. D., "Particle Size Measurements," Laboratory for Energiteknik, Technical University of Denmark, Lyngby, Denmark. (July 1974).

Intellectual Property

Jordan, M., Hirleman, E. D., "Bulk Defect Standard for Wafer Inspection Systems, Arizona State University Invention Disclosure, May 26, 1998".

Hirleman, E. D., "Calibration Device and Technique for Laser Diffraction Particle Sizing, U.S. Patent Application 06/417487, abandoned.".

Hirleman, E. D., Nebeker, B., Zhang, H. P., "DDEFILM/FFEFILM, Computational Electromagnetics Code for Modeling Light Scattering by a Feature Embedded in a Planar Thin Film on an Infinite Half-plane, Purdue University Invention Disclosure December 26, 2006", Hitachi Corp, royalty stream to Arizona State University and Purdue University.

Nebeker, B., Hirleman, E. D., "DDSUB/FFSUB, Computational Electromagnetic Code for Modeling Light Scattering by a Feature Embedded Below the Surface of an Infinite Half-plane, Purdue University Invention Disclosure, December 26, 2006", Hitachi Corp, royalty stream to Arizona State University and Purdue University.

Nebeker, B., Hirleman, E. D., "DDSURF/FFSURF: Scattering-Light Inspection System Model and Software, Arizona State University Invention Disclosure 98-101, August 1997.", Hitachi Corp, royalty stream to Arizona State University.

C.-I., Hirleman, E. D., "High Speed Multispectral Discrimination Technology for Spectral Classification of Cells or Particles Suspended in Fluid, Purdue University Invention Disclosure #63151, 2003".

Hirleman, E. D., Sanderson, J., "Medical Information Security Architecture and Trustee System, Purdue University Invention Disclosure, November 17, 2005".

C.-i., Hirleman, E. D., "Multispectral Discrimination of Particulates Using Single Particle Detection Methods From Air and Water Systems for Biodetection, Purdue University Invention Disclosure #63152, 2003".

Hirleman, E. D., "Optical System for Time-of-flight Laser Velocimeter. U.S. Patent Application 06/417150, abandoned.".

Hirleman, E. D., "Optimal Scaling for Fraunhofer Diffraction Particle Sizing Instruments, Arizona State University Patent Disclosure, December 22, 1986.".

Starr, G. W., Hirleman, E. D., "Particle Position Determination on Patterned Surfaces by Zeroth Order Diffraction Monitoring, Arizona State University Invention Disclosure, July 30, 1998".

Hirleman, E. D., "Successive Order Model for Multiple Scattering in Fraunhofer Diffraction Particle Sizing, Arizona State University Patent Disclosure, December 22, 1986. Incorporated into particle sizing instrument produced by Insitec, Inc. San Ramon, CA".

Robinson, J. P., Rajwa, B., Bayraktar, B., Bhunia, A. K., Hirleman, E. D., Bae, E., "System and Method of Organism Identification, Purdue University Invention Disclosure #64405, 2005, U.S. Provisional Patent Application No. 60/880,576 filed January 16, 2006, full U.S. Patent Application filed January 11, 2007.", Provisional, Indiana Technology Group, Purdue Research Park, West Lafayette, IN, royalty stream to Purdue University.

Suresh, L., Diaz, R., Hirleman, E. D., "Total Internal Reflection Scatterometer for Defect Detection on Transparent Substrates, ASU Invention Disclosure 99-045", Intel Corp., royalty stream to Arizona State University.

Hirleman, E. D., Guo, S., Bhunia, A. K., Bae, E. W., Patent, "System and Method for Rapid Detection and Characterization of Bacterial Colonies Using Forward Light Scattering", 7,465,560, Indiana Technology Group, Purdue Research Park, W. Lafayette, IN, royalty stream to Purdue. (approve: 2008).

Hirleman, E. D., Holve, D. J., Patent, "Ensemble Diffraction Particle Sizing System with Axial Spatial Resolution", 5,101,113, Insitec, Inc., San Ramon, CA, with royalty stream to ASU. (approve: 1992).

Hirleman, E. D., Patent, "Programmable Detector Configuration for Fraunhofer Diffraction Particle Sizing Instruments", 5,007,737. (approve: 1991).

Hirleman, E. D., Patent, "Technique for Simultaneous Particle Size and Velocity Measurements", 4,251,733. (approve: 1981).

Hirleman, E. D., Wittig, S.L.K., Patent, "Multiple Ratio Single Particle Counter", 4,188,121. (approve: 1978).

Professional Service

Advisory Board, Engineers for a Sustainable World, Chair. (2010 - Present).

Purdue Chapter of Engineers for a Sustainable World, Advisor, West Lafayette, IN, USA. (2008 - Present).

Executive Committee, Confucius Institute, Purdue University, Member, West Lafayette, IN, USA. (2007 - Present).

Executive Committee, Mechanical Engineering Department Heads, Center for Education, ASME. (2005 - Present).

Advisory Board, Engineers for a Sustainable World, Vice Chair. (2009 - 2010).

Engineers for a Sustainable World, Chair of Fundraising and Board Development subcommittees. (2009 - 2010).

Global Strategy Task Force, Mechanical Engineering Department Heads, Center for Education, ASME, Chair. (2007 - 2010).

Thirteenth Annual Colloquium on International Engineering Education, Steering Committee, Newport, RI, USA. (November 2010).

National Conference, Engineers for a Sustainable World, Purdue University, Co-Chair, West Lafayette, IN, USA. (October 2010).

2010 International Leadership Summit - Mechanical/Multi-Disciplinary Engineering Education, ASME, Organizer, Istanbul, Turkey. (May 2010).

2010 International Mechanical Engineering Education Conference, ASME, Organizer, Newport Beach, CA, USA. (March 2010).

Twelfth Annual Colloquium on International Engineering Education, Steering Committee, Ames, IA, USA. (October 2009).

2009 ASME Annual Meeting, Panelist, Palm Desert, CA, USA. (June 2009).

2009 International Mechanical Engineering Education Conference, ASME, Organizer, Hilton Head, SC, USA. (March 2009).

Eleventh Annual Colloquium on International Engineering Education, Steering Committee, Newport, RI, USA. (November 2008).

National Summit Meeting on the Globalization of Engineering Education, Co-Chair, Newport, RI, USA. (November 2008).

International Research and Education in Engineering (IREE), Chair, Washington, D.C., USA. (May 2008).

Panel on Making Global Programs Work, Chair, Galveston, TX, USA. (April 2008).

IMECE 2007, Panelist, Seattle, WA, USA. (2007).

ASTM International Committee E56 on Nanotechnology, Member. (2004 - 2007).

Session 1 on Industry Perspective on Needs for Global Aspects in the Engineering Curriculum, Tenth Annual Colloquium on International Engineering Education, Purdue University, Chair, West Lafayette, IN, USA. (November 2007).

Tenth Annual Colloquium on International Engineering Education, Steering Committee and Local Arrangements, West Lafayette, IN, USA. (November 2007).

International Research and Education in Engineering (IREE), Purdue University, Chair, West Lafayette, IN, USA. (October 2007 - November 2007).

Scientific Committee, Eighth International Congress on Optical Particle Sizing, Member, Graz, Austria. (July 2007).

Session on Leading Change in Engineering Departments in Department Leadership Workshop, Chair, Dorado, Puerto Rico. (March 2007).

Steering Committee, American National Standards Institute (ANSI) Nanotechnology Standards Panel, Member. (2004 - 2006).

Session on Defining the Global Engineer, Ninth Annual International Colloquium on International Engineering Education, Chair, Newport, RI, USA. (November 2006).

Steering Committee, Ninth Annual International Colloquium on International Engineering Education, Member, Newport, RI, USA. (November 2006).

Joint Chinese Mechanical Engineering Society (CSME) ASME Education Conference, Chair, Beijing, China. (March 2006).

Advisory Council, University of Texas ME Department, Member. (2002 - 2005).

8th International Colloquium on International Engineering Education, Course Co-Director, Atlanta, GA, USA. (November 2005).

Steering Committee, Eighth Annual Interntional Colloquium on International Engineering Education, Member, Atlanta, GA, USA. (November 2005).

Academic Advisory Council, Industrial Research Institute, Member, Washington, D.C.. (2001 - 2004).

Steering Committee, Seventh Annual International Colloquium on International Engineering Education, Member, Providence, RI, USA. (November 2004).

Scientific Committee, Seventh International Congress on Optical Particle Sizing, Member, Kyoto, Japan. (August 2004).

American Society of Testing Materials, Subcommittee F1.06 on Silicon Materials, Member. (1990 - 2001).

Scientific Committee, Sixth International Congress on Optical Particle Sizing, Member, Brighton, UK. (April 2001).

Defect Metrology Working Group, International Technology Roadmap for Semiconductors, Co-Chair. (1996 - 1999).

Scientific Committee, Fifth International Congress on Optical Particle Sizing, Member, Minneapolis, MN, USA. (August 1998).

Applied Optics, Topical Editor. (1994 - 1996).

International Standards Organization (ISO) Technical Committee 24 on Particle Characterization, Member. (1988 - 1995).

American Society of Testing Materials, Subcommittee E29.04 on Liquid Particle Sizing Techniques, Member. (1978 - 1995).

Scientific Committee, Fourth International Congress on Optical Particle Sizing, Member, Nurnberg, Germany. (March 1995).

Particle Characterization, Editorial Review Board Member. (1988 - 1994).

Applied Optics, Topical Editor. (1991 - 1993).

Scientific Committee, Third International Congress on Optical Particle Sizing, Member, Yokohama, Japan. (August 1993).

Academic Affairs Committee, American Institute of Aeronautics and Astronautics, Member. (1989 - 1992).

Propellants and Combustion Technical Committee, American Institute of Aeronautics and Astronautics, Member. (1989 - 1992).

Sensor Systems Tech. Committee, American Institute of Aeronautics and Astronautics. (1989 - 1992).

Applied Optics Special Issue on Optical Particle Sizing, Editor. (September 1991).

Second International Congress on Optical Particle Sizing, Chair, Tempe, Arizona. (March 1990).

Second ASTM Symposium on Liquid Particle Size Measurement Techniques, Chair, Atlanta, GA. (November 1988).

American Society of Mechanical Engineers, Professional Development, Arizona Section, Member. (1985 - 1987).

The Combustion Institute, Executive Committee, Western States Section, Member. (1979 - 1987).

Symposium on Flow and Particle Diagnostics, 6th International Congress on Lasers and Electro-optics, Chair, San Diego, CA, USA. (November 1987).

Scientific Committee, First International Congress on Particle Sizing, Member, Rouen, France. (May 1987).

Symposium on Flow and Particle Diagnostics, 5th International Congress on Lasers and Electro-optics, Chair, Arlington, VA, USA. (November 1986).

Program Committee, Particle Sizing and Spray Analysis Symposium, SPIE Conference on Optical and Electo-optical Engineering, Member, San Diego, CA, USA. (August 1985).

American Society of Mechanical Engineers, Arizona Section, University Relations Chair. (1982 - 1984).

American Society of Mechanical Engineers, Student Section, Arizona State University, Faculty Advisor, AZ, USA. (1982 - 1983).

Session Aides and Local Arrangements, 28th ASME International Gas Turbine Conference, Chair, Phoenix, AZ, USA. (March 1983).

Symposium on Engineering Applications of Laser Velocimetry, ASME Winter Annual Meeting, Session Chair, Phoenix, AZ, USA. (November 1982).

Local Arrangements, Fall 1981 Meeting of the Western States Section Combustion Institute, Chair, Tempe, AZ, USA. (October 1981).

Consulting

Argonne National Laboratory.

Digital Equipment Corp..

Dynamics Technology, Inc..

Garrett Turbine Engine Co..

KVB, Inc..

Laser Electro-optics LLC.

Laser Electro-optics Ltd. (principal).

Metrolaser, Inc..

Phelps Dodge Corporation.

Spectron Development Laboratories.

TEACHING

Teaching Experience

Other Courses Taught

ECE 100, Introduction to Engineering, one semester, Arizona State University.

ECE 106, Introduction to Computer-aided Engineering, three semesters, Arizona State University.

ECE 340, Thermodynamics, six semesters, Arizona State University.

ECE 382, Transport Phenomena, four semesters, Arizona State University.

ENG 100 (lectures), each semester, Purdue University.

MAE 305, Measurements and Microcomputers, six semesters, Arizona State University.

MAE 405, Microprocessor-aided Processes in Mechanical Engineering, six semesters, Arizona State University.

MAE 443, Engineering Design, three semesters, Arizona State University.

MAE 456, Combustion, two semesters, Arizona State University.

MAE 468, Aerospace Systems Design, one semester, Arizona State University.

MAE 504, Laser Diagnostics, eight semesters, Arizona State University.

ME 290, Professional Seminar each semester, Purdue University.

ME 463, three sections capstone design course, Purdue University.

Other

Review Course.
Primary responsibility for developing MAE 504 for the Mechanical & Aerospace department at Arizona State University.
MAE 504, Laser Diagnostic Techniques. Laser/optical measurement techniques for combustion, fluid mechanics, heat transfer, and manufacturing. Lecture topics include electro-magnetic wave theory, laser fundamentals, Gaussian beam propagation, laser velocimetry, particle sizing, fiber optic sensors, imaging and holography, and surface inspection.

Review Course.
In conjunction with other faculty of the Systems and Design Group, was involved in development of an undergraduate engineering curriculum with a systematic integration of design content beginning with the freshman year and continuing through to the final senior design project course. Helped integrate the philosophy into ECE 100, MAE 443, and MAE 468, the capstone mechanical and aerospace design course. Arizona State University.

Review Course.
ME 463 Global Service Learning as Capstone Design.
1) Water System Design for Humatas de Anasco, PR, 2) Solar Oven for use in Tanzania, 3) Irrigation system for Bugesera, Rwanda, 4) Rainwater Harvesting and Solar Water Heating System for Tenwek Hospital, Bomet, Kenya.

Review Course.
ME 263/363/463 Design/Manufacturing Sequence.

Review Course.
ME 499/463 Global Design. Architect of the Global Engineering Alliance for Research and Education (GEARE) Program. Purdue University.

Guest Lecture, (February 16, 2010).
"Assessment of the Global Dimensions of Engineering".
NSF, Washington, D.C.

Review Course, (2005).
Involved in substantial course/curriculum development in ME 463, Engineering Design. Offered Multidiscplinary project on Design/build of an Autonomous Vehicle, including students from Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering as well as ME students from Universitat Karlsruhe, spring and fall, 2005. Purdue University.

Review Course, (2005).

Involved in substantial course/curriculum development in ME 463, Engineering Design. Developed distance collaborative design project on "Mini-Baja Steering Systems: a Global Platform Solution", with students from Purdue and ITESM (Monterrey Tech) - Mexico City campus, fall 2005. Purdue University.

Review Course, (1990 - 2000).
Primary responsibility for developing MAE 305 for the Mechanical & Aerospace department at Arizona State University.
MAE 305 Measurements and Microcomputers, includes three lectures and a three hour laboratory per week. The course topics include measurement systems analysis, measurement uncertainty, sensors/transducers, microcomputer architecture, instruction sets, input/output, interfacing, and data acquisition system fundamentals including D/A and A/D conversion. Required undergraduate course, prerequisite course for MAE lab courses. Offered fall, 1990-2000, superseded by MAE 319.

Guest Lecture, (September 1998).
"Light Scattering by Particles and Defects on Surfaces: Semiconductor Wafer Inspection".
International Workshop on Light Propagation and Scattering in Dense Media and Rough Surfaces, Laredo, Spain.

Guest Lecture, (August 1998).
"Light Scattering by Particles on Surfaces".
University of Minnesota, Minneapolis, MN.

Guest Lecture, (May 25, 1994 - May 27, 1994).
"Optical Measurements of Particles and Sprays".
Technical University of Delft, The Netherlands.
Course Director and Lecturer.

Guest Lecture, (March 24, 1994 - March 25, 1994).
"Applications of Scanned Probe Microscopy"
National Institute of Standards and Technology (NIST), Gaithersburg, MD.

Guest Lecture, (January 12, 1993 - January 15, 1993).
"Optical Measurements of Particles and Sprays".
Technical University of Delft, The Netherlands.
Course Director and Lecturer.

Guest Lecture, (May 14, 1990 - May 16, 1990).
"Particle and Flow Diagnostics".
Carnegie-Mellon University.

Guest Lecture, (April 21, 1987 - April 23, 1987).
"Particle and Flow Diagnostics".
Carnegie-Mellon University.

Review Course, (1980 - 1986).
Primary responsibility for developing MAE 405 for the Mechanical & Aerospace Engineering department at Arizona State University.
MAE 405, Microcomputer-aided Processes in MAE, two lectures and a three hour laboratory per week. Course topics include: microcomputer architecture, assembly code, input/output, data acquisition fundamentals, D/A and A/D conversion, and applications. Offered 1980-1986.

Guest Lecture, (April 30, 1984 - May 2, 1984).
"Laser Diagnostics of Sprays".
Carnegie-Mellon University

Guest Lecture, (April 19, 1982 - April 23, 1982).
"Laser Instrumentation for Aerosol Measurement".
University of Tennessee Space Institute, Tullahoma, TN.

Guest Lecture, (November 9, 1981 - November 10, 1981).
"Droplet Sizing Methods".
Short Course at Spectron Development Labs, Irvine, CA.

Guest Lecture, (August 7, 1980 - August 11, 1980).
"Combustion Evaluation for Air Pollution Control".
EPA Short Course for Air Pollution Engineering, Los Angeles, CA.

Course Director and Lecturer.

Guest Lecture, (June 23, 1980 - June 27, 1980).
"Theory and Application of the Laser Velocimeter".
Tullahoma, TN.

Guest Lecture, (September 10, 1979 - September 14, 1979).
"Combustion Evaluation for Air Pollution Control".
EPA Short Course for Air Pollution Engineering, Tempe, AZ.
Course Director and Lecturer.

Guest Lecture, (February 4, 1979 - February 8, 1979).
"Combustion Evaluation for Air Pollution Control".
EPA Short Course for Air Pollution Engineering, Davis, CA.
Course Director and Lecturer.

Directed Individual/Independent Study

August 1998, B. Nebeker, Advisor Senior Multi-Discipline Engineer, Raytheon Corporation, Tucscon, AZ

December 1996, R. Subrumanian, Advisor Research report

1996, S. Schmittinger, Advisor Dipl. Arb.

Advised with S.L.K. Wittig

October 1994, R. Schmehl, Advisor Dipl. Arb.

Advised with S.L.K. Wittig

August 1994, M. Liswith, Advisor SRC Fellow

1988, C. LeBeau, Advisor Research report

1982 - 1983, V. A. Ruscello, Advisor Research project

1981 - 1983, P.F. Murtaugh, Advisor Research project

August 1983, A. Almukbel, Advisor Research report

Doctoral Committee

N. Bai, Advisor PhD expected in 2010.

December 2006, E. W. Bae, Advisor

December 2006, M. Venkatapathi, Advisor

August 2005, H. P. Zhang, Advisor

December 2002, B. Buckner, Advisor

May 2000, M. Jordan, Advisor

May 2000, P. Ding, Advisor

December 1997, G. Starr, Advisor

November 1995, C. Heffels, Advisor Advised with B. Scarlett

August 1995, M. Schneider, Advisor Advised with D. Metzger and S.L.K. Wittig

August 1992, E. Bawolek, Advisor

1988, D. A. Bridenstine, Advisor Advised with B.W. McNeill

May 1987, J. A. Koo, Advisor Advised with R. Goulard, George Washington University

Master's Thesis Committee

T. Williams, Advisor M.S. expected in 2011.

May 2004, S. L. Guo, Advisor

May 1996, B. Buckner, Advisor

August 1995, C. Friedrichs, Advisor Advised with S.L.K. Wittig

August 1994, T. Warner, Advisor

May 1991, S. Kenney, Advisor

December 1990, M. Ward, Advisor Advised with R. Peck

August 1990, F. Davis, Advisor Advised with B.W. McNeill

May 1990, K. Parsons, Advisor

May 1988, P. Koury, Advisor

December 1986, D. Weber, Advisor

August 1980, H. K. Moon, Advisor

Postdoctoral Research Supervision

B. Nebeker, Advisor Senior Multi-Discipline Engineer, Raytheon Corporation, Tucson, AZ

H. Tan, Advisor President, consulting firm, Irvine, CA

L. Suresh, Advisor Technical staff, KLA-Tencor Inc., Milpitas, CA

M. V. Otugen, Advisor Professor and Chair, Mechanical Engineering Department, Southern Methodist University, Dallas, TX

P. E. Dellenback, Advisor Professor and Acting Department Head, Mechanical Engineering Department, University of Wyoming, Laramie, WY

Y. Yue, Advisor Technical staff, Spectron Development (ret.)

2007 - Present, Eui Won Bae, Advisor

2007 - Present, M. Venkatapathi, Advisor Assistant Professor, Supercomputer Education and Research Center, Indian Institute of Science, Bangalore, India

SERVICE

Department Service

Chair, Facilities and Space Committee, Mechanical and Aerospace Engineering Dept., Arizona State University. (1993 - 1994).

Chair, Facilities and Space Committee, Mechanical and Aerospace Engineering Dept., Arizona State University. (1990 - 1991).

Chair, Undergraduate Affairs Committee, Mechanical and Aerospace Engineering Dept., Arizona State University. (1988 - 1990).

Chair, Systems and Design Group, Mechanical and Aerospace Engineering Dept., Arizona State University. (1984 - 1985).

School/College Service

Member, Diversity Action Committee, College of Engineering, Purdue University. (2004 - Present).

Member, Finance Team, College of Engineering, Purdue University. (2006 - 2007).

Chair, Finance Team, College of Engineering, Purdue University. (2004 - 2006).

Chair, Nanotechnology Signature Area Faculty Search Committee, Schools of Engineering, Purdue University. (2003 - 2005).

Member, Head Evaluation Process Committee, College of Engineering, Purdue University. (2002 - 2003).

Co-Chair, College of Engineering Committee on Emerging Educational Opportunities: Engineering Excellence 2000, Arizona State University. (1994 - 1995).

Member, College of Engineering Committee on Space Utilization, Arizona State University. (1994 - 1995).

Member, College of Engineering Graduate Council, Arizona State University. (1989 - 1991).

Member, College of Engineering Retention Committee, Arizona State University. (1989 - 1991).

Member, College of Engineering Core Curriculum Committee, Arizona State University. (1988 - 1990).

Member, College of Engineering ECE 333 (Instrumentation Course) Committee, Arizona State University. (1987 - 1990).

Member, College of Engineering Grievance Committee, Arizona State University. (1987 - 1990).

Chair, College of Engineering Committee on Teaching Evaluations and Awards, Arizona State University. (1988).

Member, ECE 340 (Thermodynamics) Committee, Arizona State University. (1980 - 1983).

Member, College of Engineering Committee on Student Dishonesty, Arizona State University. (1980 - 1982).

University Service

Board of Directors, Greyhouse Coffee and Supply, Purdue University. (2009 - Present).

Board of Directors, Purdue Christian Campus House. (2009 - Present).

Member, Sustaining New Synergies Steering Committee, Purdue University. (2009 - Present).

Member, Sustaining New Synergies, Purdue University. (2009 - Present).

Advisor, Purdue Racketball Club. (1999 - Present).

Chair, Globalization Working Group, Purdue University. (2007 - 2008).

Engineering Chair, Purdue United Way Campaign. (2005).

President, The Aslan Society, Arizona State University. (1998 - 1999).

Advisor, Arizona State University International Students Club. (1993 - 1999).

Member, Sunset Review Committee for the Center for Advanced Transportation Systems Research, Arizona State University. (1994 - 1995).

Advisor, Arizona State University Racquetball Club. (1990 - 1992).

Advisor, Arizona State University International Students Club. (1978 - 1992).

Member, University Committee on Patents and Trademarks, Arizona State University. (1987 - 1990).

Member, Committee on Radiation Safety, Arizona State University. (1981 - 1984).

Member, University Committee on Patents and Trademarks, Arizona State University. (1981 - 1984).

Representative, Faculty Senate, Arizona State University. (1981 - 1983).

Public Service

Founding President, Kairos Ministries, Inc.. (1988 - 2004).