Thomas Bifano

Director, Boston University Photonics Center
Professor Mechanical Engineering Department
8 St Mary's St., Boston, MA 02215,
617-314-4083, tgb@bu.edu, https://bifanolab.website

Education

Duke University Mechanical Engineering & Materials Science, BS, 1980
Duke University Mechanical Engineering & Materials Science, MS, 1983
North Carolina State University, Mechanical Engineering, Ph.D.1988
Dissertation: "Ductile Regime Grinding of Brittle Materials," Thomas A. Dow, advisor

Appointments

Director, Photonics Center, Boston University, 2006-present
Professor, Mechanical Engineering Dept., Boston University, 1999-present
Vice President and Associate Provost ad interim for Research Boston University, 2024-2025
Chief Technical Officer, Boston Micromachines Corp., Cambridge, MA, 1999-2025
Professor and Chair, Manufacturing Engineering Dept., Boston University, 1999-2006
President, Prism Corporation, Boston, MA, 1995-2000
Associate Professor, Aerospace and Mechanical Eng'g. Dept., Boston University, 1994-1999
Assistant Professor, Aerospace/Mechanical Eng'g. Dept., Boston University; 1988-1994

Research

Microelectromechanical Systems (MEMS); Optomechanical devices; Deformable mirrors; Manufacturing of optical components; Adaptive optics; Microscopy; Tissue engineering

Honors, Awards Patents

2023 BU Innovator of the Year
2013 BU College of Engineering Distinguished Scholar Award
2010 R&D 100 Award: (MEMS)-based adaptive optics optical coherence tomography
2009 Bepi Colombo Prize, for achievements in research, innovation, and tech. transfer
2007 R&D 100 Award: Adaptive optics scanning laser ophthalmoscope (MAOSLO)
2003 R&D 100 Award: MEMS-based adaptive optics phoropter (MAOP)

Patents

2025 High throughput screening system for engineered cardiac tissues, US12436317
2022 Reverberation microscopy systems and methods, US11226474
2020 Reverberation microscopy systems and methods, US10678037
2019 Solid immersion microscopy system with deformable mirror for correction of aberrations, US10175476B2
2018 Adaptive optics for imaging through highly scattering media in oil reservoir applications, US10018817
2011 MEMS based retroreflector, US7929195
2005 Ion beam modification of residual stress gradients in thin film polycrystalline silicon membranes, US6929721
2004 Micro valve arrays for fluid flow control, US6705345
2003 MEMS-based spatial-light modulator with integrated electronics, US6529311

1998 Process for manufacturing optical data storage disk stamper, US5783371

Professional Service

Conference Chair, SPIE BIOS AO and Wavefront Control for Biosystems, 2015-present
Member, Army Science Board, 2011-2014
SPIE Technical program Chair, MEMS Adaptive Optics I-IX, 2004-2013
Board of Advisors, Schott AG, 2009-2012
Associate Editor, Journal of Micro/Nanolithography, MEMS, and MOEMS 2006-2008
Associate Editor, Int'l J. Mfg. Science and Production 2002-2004
Associate Editor, SME J. Manufacturing Processes 2000-2004
Board of Directors, ASPE, 1994-1996
Chairman Annual and Topical ASPE Conferences, 1994, 1995

University Service

Director, Boston University Photonics Center, 2006-present
Director, Precision Engineering Research Laboratory (BU-PERL), 1990-present
Chair, University Export Control Committee, 2018-present
Member, University Center Directors Committee, 2015-present
Member, Research and Scholarly Activities Committee, 2015-present
Vice President and Associate Provost *ad interim* for Research, 2024-2025
Member, University Strategic Planning Task Force, 2019-2021
Chair, University Research Council, 2008-2011
Chair, Dean Search Committee, College of Engineering, 2005-2006
Chair, Provost's Faculty Advisory Committee on Photonics, 2005-2006
Chair, Faculty Council, Appt., Tenure, and Promotion Policy Comm., 2003-2004
Presidential University Graduate Fellowship Committee 1994-1999
Director, Aerospace/Mechanical Eng. graduate programs, 1988-1991
Faculty advisor to engineering residence hall (Claflin 11), 1990-1995
Faculty advisor to "In Achord," BU a cappella singing group, 1993-1995

Activity Highlights

Director, **Boston University Photonics Center.** Dr. Bifano directs this core facility and academic center of excellence comprised of fifty faculty members and fifteen staff members from eight academic departments. He leads Center programs for education, scholarly research, and technology development. He manages a state-of-the-art facility that includes more than a dozen special-purpose and shared research laboratories and a large business innovation center.

Co-founder, **Boston Micromachines Corporation,** a university spin-off company that was formed to commercialize micromachined deformable mirror technology initially developed in the Bifano laboratory.

Journal Publications

Man, W. & Bifano, T. Electromagnetic deformable mirror fabricated using silicon micromachining and stress-resilient assembly. ***Advanced Optical Technologies*** **14** (2025). https://doi.org/10.3389/aot.2025.1511907

Ewoldt, J. K., DePalma, S. J., Jewett, M. E., Karakan, M. Ç., Lin, Y.-M., Mir Hashemian, P., Gao, X., Lou, L., McLellan, M. A., Tabares, J., Ma, M., Salazar Coariti, A. C., He, J.,

Toussaint, K. C., Bifano, T. G., Ramaswamy, S., White, A. E., Agarwal, A., Lejeune, E., Baker, B. M. & Chen, C. S. Induced pluripotent stem cell-derived cardiomyocyte in vitro models: benchmarking progress and ongoing challenges. ***Nature Methods*** **22**, 24-40 (2024). https://doi.org/10.1038/s41592-024-02480-7

Lou, L., Bacca, N., Ma, M. S., Nautiyal, P., Bifano, T. G. & Agarwal, A. Multiscale mechanics of polydimethylsiloxane: A comparison of meso- and micro-cyclic deformation behavior. ***Journal of Applied Polymer Science*** **141**, e55546 (2024). https://doi.org/10.1002/app.55546

Wu, K., Zhu, X., Bifano, T. G., Anderson, S. W. & Zhang, X. Computational-Design Enabled Wearable and Tunable Metamaterials via Freeform Auxetics for Magnetic Resonance Imaging (Adv. Sci. 26/2024). ***Advanced Science*** **11**, 2470152 (2024). https://doi.org/10.1002/advs.202470152

Ma, M. S., Sundaram, S., Lou, L., Agarwal, A., Chen, C. S. & Bifano, T. G. High throughput screening system for engineered cardiac tissues. ***Frontiers in Bioengineering and Biotechnology*** **11** (2023). https://doi.org/10.3389/fbioe.2023.1177688

Li, H., Sundaram, S., Hu, R., Lou, L., Sanchez, F., McDonald, W., Agarwal, A., Chen, C. S. & Bifano, T. G. Dynamic Control of Contractile Force in Engineered Heart Tissue. ***IEEE Transactions on Biomedical Engineering*** **70**, 2237-2245 (2023). https://doi.org/10.1109/TBME.2023.3239594

Haber, A. & Bifano, T. Dual-update data-driven control of deformable mirrors using Walsh basis functions. ***Journal of the Optical Society of America A*** **39**, 459-469 (2022). https://doi.org/10.1364/JOSAA.447879

Wu, K., Zhao, X., Bifano, T. G., Anderson, S. W. & Zhang, X. Auxetics-Inspired Tunable Metamaterials for Magnetic Resonance Imaging. ***Advanced Materials*** **34**, 2109032 (2022). https://doi.org/10.1002/adma.202109032

Sinefeld, D., Xia, F., Wang, M., Wang, T., Wu, C., Yang, X., Paudel, H. P., Ouzounov, D. G., Bifano, T. G. & Xu, C. Three-Photon Adaptive Optics for Mouse Brain Imaging. ***Front Neurosci*** **16**, 880859 (2022). https://doi.org/10.3389/fnins.2022.880859

Rodríguez, C., Chen, A., Rivera, J. A., Mohr, M. A., Liang, Y., Natan, R. G., Sun, W., Milkie, D. E., Bifano, T. G., Chen, X. & Ji, N. An adaptive optics module for deep tissue multiphoton imaging in vivo. ***Nature Methods*** **18**, 1259-1264 (2021). https://doi.org/10.1038/s41592-021-01279-0

Haber, A. & Bifano, T. General approach to precise deformable mirror control. ***Optics Express*** **29**, 33741-33759 (2021). https://doi.org/10.1364/OE.439306

Chen, C., Huang, Y., Wu, K., Bifano, T. G., Anderson, S. W., Zhao, X. & Zhang, X. Polarization insensitive, metamaterial absorber-enhanced long-wave infrared detector. ***Optics Express*** **28**, 28843-28857 (2020). https://doi.org/10.1364/OE.403105

Zhao, X., Wu, K., Chen, C., Bifano, T. G., Anderson, S. W. & Zhang, X. Nonreciprocal Magnetic Coupling Using Nonlinear Meta-Atoms. ***Advanced Science*** **7**, 2001443 (2020). https://doi.org/10.1002/advs.202001443

Lin, P., Ni, H., Li, H., Vickers, N. A., Tan, Y., Gong, R., Bifano, T. & Cheng, J.-X. Volumetric chemical imaging in vivo by a remote-focusing stimulated Raman scattering microscope. ***Optics Express*** **28**, 30210-30221 (2020). https://doi.org/10.1364/OE.404869

Beaulieu, D. R., Davison, I. G., Kılıç, K., Bifano, T. G. & Mertz, J. Simultaneous multiplane imaging with reverberation two-photon microscopy. ***Nature Methods*** **17**, 283–286 (2020). https://doi.org/10.1038/s41592-019-0728-9

Pollock, C., Barrett, L. K., del Corro, P. G., Stange, A., Bifano, T. G. & Bishop, D. J. PWM as a Low Cost Method for the Analog Control of MEMS Devices. ***Journal of Microelectromechanical Systems* 28**, 245-253 (2019). https://doi.org/10.1109/Jmems.2019.2891205

Shain, W. J., Vickers, N. A., Li, J., Han, X., Bifano, T. & Mertz, J. Axial localization with modulated-illumination extended-depth-of-field microscopy. ***Biomedical Optics Express* 9**, 1771-1782 (2018). https://doi.org/10.1364/BOE.9.001771

Ba, C., Shain, W. J., Bifano, T. G. & Mertz, J. High-throughput label-free flow cytometry based on matched-filter compressive imaging. ***Biomedical Optics Express* 9**, 6145-6153 (2018). https://doi.org/10.1364/Boe.9.006145

Shain, W. J., Vickers, N. A., Negash, A., Bifano, T., Sentenac, A. & Mertz, J. Dual fluorescence-absorption deconvolution applied to extended-depth-of-field microscopy. ***Optics Letters* 42**, 4183-4186 (2017). https://doi.org/10.1364/Ol.42.004183

Li, J., Bifano, T. G. & Mertz, J. Widefield fluorescence microscopy with sensor-based conjugate adaptive optics using oblique back illumination. ***Journal of Biomedical Optics* 21** (2016). https://doi.org/10.1117/1.Jbo.21.12.121504

Imboden, M., Chang, J., Pollock, C., Lowell, E., Akbulut, M., Morrison, J., Stark, T., Bifano, T. G. & Bishop, D. J. High-Speed Control of Electromechanical Transduction: Advanced Drive Techniques for Optimized Step-and-Settle Response of MEMS Micromirrors. ***IEEE Control Systems* 36**, 48-76 (2016). https://doi.org/10.1109/MCS.2016.2584338

Sinefeld, D., Paudel, H. P., Ouzounov, D. G., Bifano, T. G. & Xu, C. Adaptive optics in multiphoton microscopy: comparison of two, three and four photon fluorescence. ***Optics Express* 23**, 31472-31483 (2015). https://doi.org/10.1364/OE.23.031472

Paudel, H. P., Taranto, J., Mertz, J. & Bifano, T. Axial range of conjugate adaptive optics in two-photon microscopy. ***Optics Express* 23**, 20849-20857 (2015). https://doi.org/10.1364/Oe.23.020849

Mertz, J., Paudel, H. & Bifano, T. G. Field of view advantage of conjugate adaptive optics in microscopy applications. ***Applied Optics* 54**, 3498-3506 (2015). https://doi.org/10.1364/ao.54.003498

Li, J., Beaulieu, D. R., Paudel, H., Barankov, R., Bifano, T. G. & Mertz, J. Conjugate adaptive optics in widefield microscopy with an extended-source wavefront sensor. ***Optica* 2**, 682-688 (2015). https://doi.org/10.1364/Optica.2.000682

Vigil, K., Lu, Y., Yurt, A., Abanoz Cilingiroglu, T., Bifano, T., ünlü, M. S. & Goldberg, B. Integrated Circuit Super-Resolution Failure Analysis with Solid Immersion Lenses. ***Electronic Device Failure Analysis* 16**, 26-32 (2014). https://doi.org/10.31399/asm.edfa.2014-2.p026

Lu, Y., Bifano, T., Unlu, S. & Goldberg, B. Aberration compensation in aplanatic solid immersion lens microscopy. ***Optics Express* 21**, 28189-28197 (2013). https://doi.org/10.1364/Oe.21.028189

Paudel, H. P., Stockbridge, C., Mertz, J. & Bifano, T. Focusing polychromatic light through strongly scattering media. ***Optics Express* 21**, 17299-17308 (2013). https://doi.org/10.1364/OE.21.017299

Tripathi, S., Paxman, R., Bifano, T. & Toussaint, K. C. Vector transmission matrix for the polarization behavior of light propagation in highly scattering media. ***Optics Express* 20**, 16067-16076 (2012). https://doi.org/10.1364/Oe.20.016067

Lu, Y., Stockbridge, C. R., Hoffman, S. M. & Bifano, T. G. Variable zoom system with aberration correction capability. *Journal of Modern Optics* **59**, 1049-1055 (2012). https://doi.org/10.1080/09500340.2012.681708

Goldberg, B. B., Yurt, A., Lu, Y., Ramsay, E., Koklu, F. H., Mertz, J., Bifano, T. G. & Unlu, M. S. Chromatic and spherical aberration correction for silicon aplanatic solid immersion lens for fault isolation and photon emission microscopy of integrated circuits. *Microelectronics Reliability* **51**, 1637-1639 (2011). https://doi.org/10.1016/j.microrel.2011.07.047

Bifano, T. Adaptive imaging: MEMS deformable mirrors. *Nature Photonics* **5**, 21-23 (2011). https://doi.org/10.1038/nphoton.2010.297

Diouf, A., Stewart, J. B., Cornelissen, S. A. & Bifano, T. G. Development of through-Wafer Interconnects for Mems Deformable Mirrors. *International Journal of Optomechatronics* **4**, 237-245 (2010). https://doi.org/10.1080/15599612.2010.510589

Vogel, C., Tyler, G., Lu, Y., Bifano, T., Conan, R. & Blain, C. Modeling and parameter estimation for point-actuated continuous-facesheet deformable mirrors. *Journal of the Optical Society of America A* **27**, A56-A63 (2010). https://doi.org/10.1364/JOSAA.27.000A56

Diouf, A., Legendre, A. P., Stewart, J. B., Bifano, T. G. & Lu, Y. Open-loop shape control for continuous microelectromechanical system deformable mirror. *Applied Optics* **49**, G148-G154 (2010). https://doi.org/10.1364/Ao.49.00g148

Cornelissen, S. A., Bierden, P. A., Bifano, T. G. & Lam, C. V. 4096-element continuous face-sheet MEMS deformable mirror for high-contrast imaging. *Journal of Micro-Nanolithography Mems and Moems* **8** (2009). https://doi.org/10.1117/1.3158067

Diouf, A., Reimann, G. & Bifano, T. Fabrication of implantable microshunt using a novel channel sealing technique. *Journal of Micro-Nanolithography Mems and Moems* **7** (2008). https://doi.org/10.1117/1.2955935

Stewart, J. B., Diouf, A., Zhou, Y. & Bifano, T. G. Open-loop control of a MEMS deformable mirror for large-amplitude wavefront control. *Journal of the Optical Society of America a-Optics Image Science and Vision* **24**, 3827-3833 (2007). https://doi.org/10.1364/JOSAA.24.003827

Stewart, J. B., Bifano, T. G., Cornelissen, S., Bierden, P., Levine, B. M. & Cook, T. Design and development of a 331-segment tip–tilt–piston mirror array for space-based adaptive optics. *Sensors and Actuators A: Physical* **138**, 230-238 (2007). https://doi.org/10.1016/j.sna.2007.04.051

Biss, D. P., Sumorok, D., Burns, S. A., Webb, R. H., Zhou, Y., Bifano, T. G., Cote, D., Veilleux, I., Zamiri, P. & Lin, C. P. In vivo fluorescent imaging of the mouse retina using adaptive optics. *Optics Letters* **32**, 659-661 (2007). https://doi.org/10.1364/OL.32.000659

Chen, F. Y., Cohen, H. I., Bifano, T. G., Castle, J., Fortin, J., Kapusta, C., Mountain, D. C., Zosuls, A. & Hubbard, A. E. A hydromechanical biomimetic cochlea: Experiments and models. *Journal of the Acoustical Society of America* **119**, 394-405 (2006). https://doi.org/10.1121/1.2141296

Miller, M., Perrault, J., Parker, G., Bettig, B. & Bifano, T. Simple models for piston-type micromirror behavior. *Journal of Micromechanics and Microengineering* **16**, 303-313 (2006). https://doi.org/10.1088/0960-1317/16/2/015

Santiago, L. P. & Bifano, T. G. Management of R&D projects under uncertainty: A multidimensional approach to managerial flexibility. *Ieee Transactions on Engineering Management* **52**, 269-280 (2005). https://doi.org/10.1109/tem.2005.844465

Collier, J., Wroblewski, D. & Bifano, T. Development of a rapid-response flow-control system using MEMS microvalve arrays. ***Journal of Microelectromechanical Systems*** **13**, 912-922 (2004). https://doi.org/10.1109/JMEMS.2004.838392

Webb, R., Albanese, M., Zhou, Y., Bifano, T. & Burns, S. Stroke amplifier for deformable mirrors. ***Applied Optics*** **43**, 5330-5333 (2004). https://doi.org/10.1364/AO.43.005330

Lee, H., Miller, M. & Bifano, T. CMOS chip planarization by chemical mechanical polishing for a vertically stacked metal MEMS integration. ***Journal of Micromechanics and Microengineering*** **14**, 108-115 (2004). https://doi.org/10.1088/0960-1317/14/1/015

Bifano, T. G., Johnson, H. T., Bierden, P. & Mali, R. K. Elimination of stress-induced curvature in thin-film structures. ***Journal of Microelectromechanical Systems*** **11**, 592-597 (2002). https://doi.org/10.1109/Jmems.2002.802908

Horenstein, M. N., Pappas, S., Fishov, A. & Bifano, T. G. Electrostatic micromirrors for subaperturing in an adaptive optics system. ***Journal of Electrostatics*** **54**, 321-332 (2002). https://doi.org/10.1016/S0304-3886(01)00159-0

Weyrauch, T., Vorontsov, M. A., Bifano, T. G., Hammer, J. A., Cohen, M. & Cauwenberghs, G. Microscale adaptive optics: wave-front control with a mu-mirror array and a VLSI stochastic gradient descent controller. ***Applied Optics*** **40**, 4243-4253 (2001). https://doi.org/10.1364/Ao.40.004243

Shanbhag, P., Feinberg, M., Sandri, G., Horenstein, M. & Bifano, T. Ion-beam machining of millimeter scale optics. ***Applied Optics*** **39**, 599-611 (2000). https://doi.org/10.1364/AO.39.000599

Horenstein, M. N., Perreault, J. A. & Bifano, T. G. Differential capacitive position sensor for planar MEMS structures with vertical motion. ***Sensors and Actuators A - Physical*** **80**, 53-61 (2000). https://doi.org/10.1016/S0924-4247(99)00251-4

Mali, R. K., Bifano, T. & Koester, D. A design-based approach to planarization in multilayer surface micromachining. ***Journal of Micromechanics and Microengineering*** **9**, 294-299 (1999). https://doi.org/10.1088/0960-1317/9/4/302

Horenstein, M., Bifano, T., Pappas, S., Perreault, J. & Krishnamoorthy-Mali, R. Real time optical correction using electrostatically actuated MEMS devices. ***Journal of Electrostatics*** **46**, 91-101 (1999). https://doi.org/10.1016/S0304-3886(99)00015-7

Bifano, T. G., Perreault, J., Mali, R. K. & Horenstein, M. N. Microelectromechanical deformable mirrors. ***Ieee Journal of Selected Topics in Quantum Electronics*** **5**, 83-89 (1999). https://doi.org/10.1109/2944.748109

Bifano, T., Krishnamoorthy, R., Fawcett, H. & Welch, E. Fixed-Load Electrolytic Dressing With Bronze Bonded Grinding Wheels. ***Journal of Manufacturing Science and Engineering*** **121**, 20-27 (1999). https://doi.org/10.1115/1.2830570

Vandelli, N., Wroblewski, D., Velonis, M. & Bifano, T. Development of a MEMS microvalve array for fluid flow control. ***Journal of Microelectromechanical Systems*** **7**, 395-403 (1998). https://doi.org/10.1109/84.735347

Bifano, T. G., Mali, R. K., Dorton, J. K., Perreault, J., Vandelli, N., Horenstein, M. N. & Castanon, D. A. Continuous-membrane surface-micromachined silicon deformable mirror. ***Optical Engineering*** **36**, 1354-1360 (1997). https://doi.org/10.1117/1.601598

Bifano, T. G., Fawcett, H. E. & Bierden, P. A. Precision manufacture of optical disc master stampers. ***Precision Engineering-Journal of the American Society for Precision Engineering*** **20**, 53-62 (1997). https://doi.org/10.1016/S0141-6359(97)89592-X

Bifano, T. G. & Bierden, P. A. Fixed-abrasive grinding of brittle hard-disk substrates. *International Journal of Machine Tools & Manufacture* **37**, 935-946 (1997). https://doi.org/10.1016/S0890-6955(96)00089-2

Horenstein, M. N., Bifano, T. G., Mali, R. K. & Vandelli, N. Electrostatic effects in micromachined actuators for adaptive optics. *Journal of Electrostatics* **42**, 69-81 (1997). https://doi.org/10.1016/S0304-3886(97)00138-1

Mali, R. K., Bifano, T. G., Vandelli, N. & Horenstein, M. N. Development of microelectromechanical deformable mirrors for phase modulation of light. *Optical Engineering* **36**, 542-548 (1997). https://doi.org/10.1117/1.601599

Scagnetti, P. A., Nagem, R. J., Sandri, G. V. H. & Bifano, T. G. Stress and Strain Analysis in Molecular Dynamics Simulation of Solids. *Journal of Applied Mechanics* **63**, 450-452 (1996). https://doi.org/10.1115/1.2788888

Drueding, T. W., Bifano, T. G. & Fawcett, S. C. Contouring Algorithm for Ion Figuring. *Precision Engineering-Journal of the American Society for Precision Engineering* **17**, 10-21 (1995). https://doi.org/10.1016/0141-6359(94)00002-H

Drueding, T. W., Fawcett, S. C., Wilson, S. R. & Bifano, T. G. Ion beam figuring of small optical components. *Optical Engineering* **34**, 3565-3571 (1995). https://doi.org/10.1117/12.215648

Bifano, T., Yi, Y. & Kahl, W. K. Fixed Abrasive Grinding of Cvd Sic Mirrors. *Precision Engineering-Journal of the American Society for Precision Engineering* **16**, 109-116 (1994). https://doi.org/10.1016/0141-6359(94)90195-3

Fawcett, S. C., Drueding, T. W. & Bifano, T. G. Neutral Ion Figuring of Chemical-Vapor-Deposited Sic. *Optical Engineering* **33**, 967-974 (1994). https://doi.org/10.1117/12.157687

Bifano, T. G., Annear, R. & Golini, D. Chemomechanical Effects in Ductile-Regime Machining of Glass. *Principles of Cutting Mechanics: Applications to Ultra-Precision Machining and Grinding*, 71-78 (1993). https://doi.org/10.1016/0141-6359(93)90106-K

Bifano, T. G. & Hosler, J. B. Precision Grinding of Ultra-Thin Quartz Wafers. *Journal of Engineering for Industry* **115**, 258-262 (1993). https://doi.org/10.1115/1.2901658

Bifano, T. G. & Yi, Y. Acoustic emission as an indicator of material-removal regime in glass micro-machining. *Precision Engineering* **14**, 219-228 (1992). https://doi.org/10.1016/0141-6359(92)90019-S

Scattergood, R. O., Srinivasan, S., Bifano, T.G., Dow, T.A. Effetti di curva-R nella rettifica ed usura dei ceramici (R-cruve effects for machining and wear of ceramics). *Ceramica Acta* **3**, 53-64 (1991). https://bifanolab.website/files/R_Curve_1991.pdf

Bifano, T. G. & Fawcett, S. C. Specific Grinding Energy as an in-Process Control Variable for Ductile-Regime Grinding. *Precision Engineering-Journal of the American Society for Precision Engineering* **13**, 256-262 (1991). https://doi.org/10.1016/0141-6359(91)90003-2

Bifano, T. G., Dow, T. A. & Scattergood, R. O. Ductile-Regime Grinding: A New Technology for Machining Brittle Materials. *Journal of Engineering for Industry* **113**, 184-189 (1991). https://doi.org/10.1115/1.2899676

Blake, P., Bifano, T., Dow, T. & Scattergood, R. O. Precision Machining of Ceramic Materials. *American Ceramic Society Bulletin* **67**, 1038-& (1988). https://bifanolab.website/files/precision_machining.pdf

Bifano, T. G. & Dow, T. A. Real-Time Control of Spindle Runout. *Optical Engineering* **24**, 888-892 (1985). https://doi.org/10.1117/12.7973594

Graduate Students & Postdoctoral Researchers Supervised

2024 Kevin Man, PhD, MSE
2023 Marshall Ma, PhD, ME
2019 Devin Beaulieu, PhD, EE
2017 Will Shain, PhD, Physics
2016 Hari Paudel, PhD, EE
2015 Yang Lu, PhD, ME
2010 Andrew Legendre, MSME
2009 Alioune Diouf, PhD ME, Dissertation: MEMS DMs in Next Generation Telescopes
2008 Y. Zhou, PhD MfgE Dissertation: AO two photon fluorescence microscopy
2008 J. Stewart, PhD EE Dissertation: Segmented DM for astronomical imaging
2008 D.J. Kim, PhD EE Dissertation: Integrated Drivers for Large Scale MEMS Arrays
2008 M. Gingras, MSMfgE
2008 J. Castillo, MSEE
2007 J. H. Kim, PhD MfgE Dissertation: Manufacture of a Reflective Spatial Light Modulator
2007 G. Thompson, MSMfgE
2007 M. Lewis, MSME
2005 S. Kratz, MSMfgE
2005 J. Perreault PhD EE Dissertation: High Resolution MEMS Deformable Mirrors
2005 D. Sumorock, MSEE
2005 Y. Zhou, MSME
2004 G. Reimann, MSMfgE
2003 M. Albanese, MSEE
2002 T. Evans, MSME
2002 J. Collier, MSME
2002 S. Cornelissen, MSME
2001-02 Hocheol Lee, Postdoctoral Researcher
2001 C. Reherman, MSMfgE
2000 C. Hodge, MSME
2000 M. Bancu, MSME
2000 D. Malkani, MSME
1999 N. Vandelli, Ph.D.ME Dissertation: MEMS Microvalve Arrays for Flow Control
1999 P. Shanbhag, MSME
1999 M. Feinberg, MSME
1998-99 Nicholas Rosen, Postdoctoral Researcher
1998 R. K. Mali, PhD, ME Dissertation: Surface Micromachined Deformable Mirrors
1997 H. E. Caggiano, PhD ME Dissertation: New method of Mfg CD Masters
1995 T. W. Drueding, PhD, ME Dissertation: Ion Figuring of Centimeter-Scale Optics
1994 P. A. Bierden, MSME
1994 R. Krishnamoorthy. MSME
1993 Y. Yi, PhD, ME Dissertation: Ultraprecision Grinding of Ceramic Mirrors
1993 E. Welch, MSME
1992 P. A. Scagnetti, MSME
1992 J. B. Hosler, MSME
1991 D. K. Depiero, MSME