Biographical Sketches

Allen Yi
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a. Professional Preparation

Boston University	Mechanical Engineering Ph.D. 1993
University of Science and Technology of China	Mechanical Engineering. B.A. 1986

b. Working Experience

Working Experience:

2012-Present	Professor, Department of Integrated Systems Engineering, OSU
2008-2012	Associate Professor, Department of Integrated Systems Engineering, OSU
2002-2008	Assistant Professor, Department of Integrated Systems Engineering, OSU

Prof Yi's responsibilities at OSU include teaching and research in high precision manufacturing engineering, precision machine design, and development of optical manufacturing processes. He specializes in process issues related to compression and injection molding of precision optics, non-traditional micro machining and freeform diamond machining using slow or fast tool servo. Prof Yi is also interested in design and fabrication of microoptics and other MEMS devices, especially processes utilizing ultraprecision machining techniques as an effort to develop low cost fabrication methods.

1993-2002 Staff Scientist, Corning Precision Lens, Cincinnati, OH

For almost 10 years with Corning, Prof Yi's main responsibilities included development of manufacturing processes of optical molds for refractive and diffractive lenses. Also at Corning, he developed processes for high volume precision glass optical manufacturing. He developed an ultraprecision grinding process and an automatic polishing apparatus for precision optical mold fabrication. He designed and built ultraprecision diamond turning machines for high volume plastic aspherical lens production. He supported the lens centering process using Loh's LZ80 edger with profiled grinding wheels. His *industrial experience* provided him with a rich background to more effectively serve as an industrial and systems engineering faculty member at OSU. His students also benefited tremendously from his extensive industrial experience.

While working at Corning, Prof Yi represented the company as an expert in high precision manufacturing in business transactions. For example, he was the technical leader in the two billion dollar acquisition of NetOptix by Corning in 2000. He and his business partner conducted the due diligence review of Corning NetOptix (then NetOptix) in Keene NH and participated the negotiation of the acquisition. As of today, Corning NetOptix is still very profitable for Corning. Between 2001 and 2002, still with Corning Precision Optics, Prof Yi started teaching night classes at University of Cincinnati twice a week. This experience became the catalyst for him to finally decide to leave industry and move back to university. Facing number of unknowns and leaving a successful career in industry were extremely difficult for him and his family at the time. Today, he believes that was the best decision he ever made professionally.

c. Major Journal Publications (Partial list, 100+ while at OSU)

1. Xiaohua Liu, Lin Zhang, Wenchen Zhou, Tianfeng Zhou, Jianfeng Yu, L. James Lee, Allen Y. Yi, "Fabrication of Plano-concave Plastic Lens by Novel Injection Molding using Carbide-bonded Graphene Coated Silica Molds," *ASME Journal of Manufacturing Science and Engineering*, Vol 141, pp 081011 (2019).
2. Lin Zhang, Wenchen Zhou, and Allen Y. Yi, "Investigation of Thermoforming Mechanism and Optical Properties Change of Chalcogenide Glass In Precision Glass Molding," Applied Optics, Vol. 57, Issue 22, pp. 6358-6368 (2018)
3. Lin Zhang, Wenchen Zhou, and Allen Y. Yi, "Rapid localized heating of graphene coating on a silicon mold by induction for precision molding of polymer optics," Optics Letters, Vol 42, Issue 7, pp 1369-72, (2017).
4. H. Li, X. Zhao, N. J. Naples and A. Y. Yi, "An Integrated Approach to Design and Fabrication of a Miniature Endoscope using Freeform Optics,"Advanced Optical Technologies, 5(4) August, (2016).
5. Bo Tao, Peng He, Lianguan Shen, Allen Y. Yi, "Quantitatively Measurement and Analysis of Residual Stresses in Molded Aspherical Glass Lenses", International Journal of Advanced Manufacturing Technology, DOI 10.1007/s00170-014-6058-2, June (2014).

6. Peng He, Likai Li, Hui Li, Jianfeng Yu, L. James Lee, Allen Y. Yi, "Compression Molding of Glass Freeform Optics using Diamond Machined Silicon Mold," Manufacturing Letters, 2(2), 17-20, April (2014).
7. Bo Tao, Peng He, Lianguan Shen, Allen Y. Yi, "Annealing of Compression Molded Aspherical Glass Lenses," ASME Journal of Manufacturing Science and Engineering, 136 (1), 011008 (9 pages) November (2013).
8. H. Zhang, L. Li, D. L. McCray, S. Scheiding, N. J. Naples, A. Gebhardt, S. Risse, R. Eberhardt, A. Tünnermann, A. Y. Yi, Development of a Low Cost High Precision, Three-Layer 3D Artificial Compound Eye," Optics Express, 21(19), 22232-45 September (2013).
9. H. Zhang, S. Scheiding, L. Li, A. Gebhardt, S. Risse, R. Eberhardt, A. Tünnermann, D. G. Yao, A. Y. Yi, "Fabrication of 3D Functional Microstructures on Curved Substrates using 3D Microlens Projection," ASME Journal of Micro and Nano-Manufacturing, 1(3), 031006 (9 pages) August (2013).
10. L. K. Li, T. W. Raasch, A. Y. Yi, "Simulation and Measurement of Optical Aberrations of Injection Molded Progressive Addition Lenses," Applied Optics, 52(24), 6022-9, July (2013).
11. P. He, L. Li, J. F. Yu, W. Y. Huang, Y.-C. Yen, L. J. Lee, A. Y. Yi, "Graphene Coated Si Mold for Precision Glass Optics Molding," Optics Letters, 38(14), 2625-8, July 15 (2013).
12. J. B. Zhou, L. Li, N. J. Naples, T. Sun, A. Y. Yi, "Fabrication of Continuous Diffractive Optical Elements Using Fast Tool Servo Diamond Turning Process," Journal of Micromechanics and Microengineering, 23(7), doi:10.1088/0960-1317/23/7/075010, July (2013).
13. L. K. Li, A. Y. Yi, "An Affordable Injection Molded Precision Hybrid Glass-Polymer Achromatic Lens," The International Journal of Advanced Manufacturing Technology, DOI 10.1007/s00170-013-5128-1, June (2013).
14. H. Zhang, S. Scheiding, L. Li, A. Gebhardt, S. Risse, R. Eberhardt, A. Tünnermann, A. Y. Yi, "Manufacturing of a Precision 3D Microlens Array on a Steep Curved Substrate by Injection Molding Process," Advanced Optical Technologies, 10.1515/aot-2012-0061, April (2013).
15. L. J. Su, A. Y. Yi, "Finite Element Calculation of Refractive Index in Optical Glass Undergoing Viscous Relaxation and Analysis of the Effects of Cooling Rate and Material Properties," International Journal of Applied Glass Science, Special Issue: Progress in Glass Science and Engineering3(3), 263–74, September (2012).
16. L. Li, A. Y. Yi, "Design and fabrication of a freeform microlens array for a compact large-field-of-view compound-eye camera," Applied Optics, 51(12), 1843-52 (2012).
17. H. Zhang, L. Li, D. L. McCray, D. G. Yao, A. Y. Yi, "A microlens array on curved substrates by 3D micro projection and reflow process," Sensors and Actuators A: Physical, 179, June 2012, 242–50 (2012).
18. L. K. Li, A. Y. Yi, "Design and Fabrication of a Freeform Microlens Array for Uniform Beam Shaping," Microsystem Technologies-Micro-and Nanosystems-Information Storage and Processing Systems, 17 (12), 1713-20 (2011).
19. S. Scheiding, A. Y. Yi, A. Gebhardt, L. Li, S. Risse, R. Eberhardt, A. Tünnermann, "Freeform Manufacturing of a Microoptical Lens Array on a Steep Curved Substrate by Use of a Voice Coil Fast Tool Servo," Optics Express, 19(24), 23938-51 November (2011).
20. P. He, L. K. Li, F. Wang, K. Georgiadis, O. Dambon, F. Klocke, A. Y. Yi, "Development of a Low Cost High Precision Fabrication Process for Glass Hybrid Aspherical Diffractive Lenses," Journal of Optics, 13(8), 085703, August (2011).
21. L J. Su, A. Y. Yi, "Investigation of Glass Thickness Effect on Thermal Slumping by Experimental and Numerical Methods," Journal Materials Processing and technologies, published online, www.sciencedirect.com/science/article/pii/S0924013611001907, July (2011).
22. Y. Chen, A. Y. Yi, "Design and Fabrication of Freeform Glass Concentrating Mirrors using a High Volume Thermal Slumping Process," 95(7), 1654-64, Solar Energy Materials and Solar Cells, July (2011).
23. L. J. Su, A. Y. Yi, "Investigation of the Effect of Coefficient of Thermal Expansion on Prediction of the Refractive Index of Hot Formed Glass Lenses Using FEM Simulation," Journal of Non-Crystal Solid, 357 (15), 3006-12, 15 July (2011).
24. L. K. Li, P. He, F. Wang, K. Georgiadis, O. Dambon, F. Klocke, Allen Y. Yi, "A Hybrid Polymer-Glass Achromatic Microlens Array Fabricated by Compression Molding," Journal of Optics, 13(5), February (2011).
25. C. Yang, L. J. Su, C. N. Huang, H. X. Huang, J. M. Castro, A. Y. Yi, "Effect of Packing Pressure on Refractive Index Variation in Injection Molding of Precision Plastic Optical Lens," Advances in Polymer Technology, 30(1), 51–61, (2011).
26. L. Li, A. Y. Yi, "Design and Fabrication of a Freeform Prism Array for 3D Microscopy," Journal of Optical Society of America, 27(12), 2613-20, December (2010).
27. K. Fischbach, K. Georgiadis, F. Wang, O. Dambon, F. Klocke, Y. Chen, A. Y. Yi, "Investigation of the Effects of Process Parameters on the Glass-to-Mold Sticking Force during Precision Glass Molding," The Journal of Vacuum Science and Technology B, 205(2), 312-9, October 15 (2010).

28. C. Yang, H. X. Huang, J. M. Castro, A. Y. Yi, "Replication Characterization in Injection Molding of Microfeatures with High Aspect Ratio: Influence of Layout and Shape Factor," published, Polymer Engineering and Science, 51(5), 959–68, May (2010).
29. L. Li, A. Y. Yi, "Development of a 3D Artificial Compound Eye," Optics Express, 18(17), 18125-37 (2010).
30. L. Li, C. Yang, H. Z. Shi, W. C. Liao, H. X. Huang, L. J. Lee, J. M. Castro, A. Y. Yi, "Design and Fabrication of an Affordable Polymer Micromixer for Medical and Biomedical Applications," Polymer Engineering and Science, 50(8), 1594-604, (2010).
31. L. Li, S. A. Collins, Jr., A. Y. Yi, "Optical Effects of Surface Finish by Ultraprecision Single Point Diamond Machining," ASME Journal of Manufacturing Science and Engineering, 132(2), 021002 (9 pages) April (2010).
32. C. Yang, H. X. Huang, J. M. Castro, L. J. Lee, A. Y. Yi, "Replication Characterization of Microribs Fabricated by Combining Ultraprecision Machining and Microinjection Molding," Polymer Engineering and Science, 50(10), 2021-30, (2010).
33. L. Li, L. J. Lee, J. M. Castro, A. Y. Yi, "Improving Mixing Efficiency of a Polymer Micromixer by Use of a Plastic Shim Divider," Journal of Micromechanics and Microengineering. 20(3), 035012 (2010).
34. L. Li, C. Yang, H. Z. Shi, W. C. Liao, H. X. Huang, L. J. Lee, J. M. Castro, A. Y. Yi, "Design and Fabrication of an Affordable Polymer Micromixer for Medical and Biomedical Applications," Accepted for publication, *Polymer Engineering and Science*, (2009).
35. L. Li, A. Y. Yi, "Micro fabrication on curved surface using 3D microlens array," *Journal of Micromechanics and Microengineering*, 19, 105010 (2009)
36. W. Zhao, Y. Chen, L. G. Shen, A. Y. Yi, "Refractive index and dispersion variation in precision optical glass molding by computed tomography," *Applied Optics*, 48(19), 1 July (2009).
37. W. Zhao, Y. Chen, L. G. Shen, A. Y. Yi, "Investigation of refractive index distribution in precision compression glass molding by use of 3D tomography,", *Meas. Tech.* 20, 055109 (8pp) (2009).
38. F. Wang, Y. Chen, F. Klocke, G. Pongs, A. Y. Yi, "Numerical Simulation Assisted Curve Compensation in Compression Molding of High Precision Aspherical Glass Lenses," *ASME Journal of Manufacturing Science and Engineering,* 131(1), 011014 -9, Feb (2009).
39. C. N. Huang, L. Li, A. Y. Yi, "Design and Fabrication of a Micro Alvarez Lens Array with a Variable Focal Length," *Microsystem Technologies*, 15(4), 559-63 (2009).
40. Y. Chen, A. Y. Yi, D. G. Yao, F. Klocke, G. Pongs, "A Reflow Process for Glass Microlens Arrays Fabrication by Use of Precision Compression Molding," *Journal of Micromechanics and Microengineering*, 18, 055022 (2008)
41. L. J. Su, Y. Chen, A. Y. Yi, F. Klocke, G. Pongs "Refractive Index Variation in Compression Molding of Precision Glass Optical Lenses," *Applied Optics* 47(10), 1662-7 (2008).
42. Y. Chen, L. J. Su, A. Y. Yi, F. Klocke, G. Pongs, "Numerical Simulation and Experimental Study of Residual Stresses in Compression Molding of Precision Glass Optical Components," *Journal of Manufacturing Science and Engineering - Transactions of the ASME* October, 130, 051012-9 (2008).
43. Y. Chen, L. Li, A. Y. Yi, "Fabrication of Precision 3D Micro Structures by Use of a Combination of Ultraprecision Diamond Turning and Reactive Ion Etching Process," *Journal of Micromechanics and Microengineering*, 17(5), 883-90, 3 April (2007).
44. L. Li, A. Y. Yi, C. N. Huang, D. Grewell, A. Benatar, Y. Chen, "Fabrication of Diffractive Optics by Use of Slow Tool Servo Diamond Turning Process," *Optical Engineering*, 45(11), 1134011-9, November (2006).
45. D. G. Yao, P. Nagarajan, L. Li, A. Y. Yi, "A Strategy for Rapid Thermal Cycling of Molds in Thermoplastic Processing," *Journal of Manufacturing Science and Engineering - Transactions of the ASME*, 128(4), 837-43, Mar (2006).
46. A. Jain, A. Y. Yi, X. Xie, and R. Sooryakumar, "Finite Element Modeling of Stress Relaxation in Glass Lens Moulding Using Measured, Temperature-Dependent Elastic Modulus and Viscosity Data of Glass," *Modelling and Simulation in Materials Science and Engineering*, 14(3), 465-77, 30 March (2006).
47. A. Jain, A. Y. Yi, "Finite Element Modeling of Structural Relaxation during Annealing of a Precision Molded Glass Lens," *Journal of Manufacturing Science and Engineering - Transactions of the ASME*, 128(3), 683-90, Aug (2006).
48. A. Y. Yi, L. Li, "Design and Fabrication of a Microlens Array using Slow Tool Servo," *Optics Letters*, 30(30), 1707-9, March (2005).
49. A. Jain, A. Y. Yi, "Numerical Modeling of Viscoelastic Stress Relaxation during Glass Lens Forming Process," *Journal of American Ceramic Society*, 88(3), 530-5, March (2005).
50. A. Y. Yi, A. Jain, "Compression Molding of Aspherical Glass Lenses - A Combined Experimental and Numerical Analysis," *Journal of American Ceramic Society*, 88(3), 579-86, March (2005).

d. Honors and Awards

- Fraunhofer ProfX^2 award, "Ultraprecision Machining of Optical Mold" Sponsor: Fraunhofer Institute for Optics and Fine Mechanics, Jena, and Fraunhofer Munich, Germany (2010-2011).
- Lumley Interdisciplinary Research Award, OSU (2010).
- Nominated twice for Fraunhofer Bessel Award by IPT, Fraunhofer Munich (2006 and 2008).
- Lumley Research Award, OSU (2008).
- NSF (2006) Faculty Early Career Development Grant (**CAREER**), "Economically Feasible Net Shape Manufacturing of Macro and Micro Glass Optics." This is the only early career award he was eligible to apply due to limit on age or time after Ph.D.
- Airforce Summer Faculty Fellowship, Wright-Patterson AFB, Ohio (2006).
- Fraunhofer ProfX^2 award, "Numerical Simulation of High Temperature Compression Molding of Glass Optics" Sponsor: Fraunhofer Institute for Production Technology, Aachen, and Fraunhofer Munich, Germany (2004-2005).
- Achievement Recognition Award for successfully implementing the CNC automatic glass lens manufacturing lines at Corning Precision Lens (1998).
- Achievement Recognition Award for improving manufacturing process for plastic lenses finishing process at Corning Precision Lens (1994).

e. Externally Funded Projects

- ~$7m as PI. ~$1m as co-PI
- ~$1.5m as PI and ~$1m as co-PI from NSF/NASA/NIH.
- ~$2 m equipment installed since 2002, including an ultraprecision machine, an optical metrology system, a microinjection molding machine and a high temperature molding press.

f. Synergistic Activities

Teaching:

Curriculum/Course development in Industrial Engineering program at OSU since 2002 (Partial list):

- *Industrial Process Control and Instrumentation*
- *Fundamentals of Modern Manufacturing Engineering*
- *Manufacturing Process and Equipment*
- *Manufacturing Processes and Simulation*
- *Machine Tool Control and Programming*
- *Precision Engineering*
- *Manufacturing Seminar* (*Participator*).

g. Service to the Scientific and Engineering Community (Partial list)

Member of the American Society for Precision Engineering (ASPE) since 1991. ASPE Organizing Committee in 1994, and 2003-2007. Associate Editor (2010-17), *ASME Journal of Manufacturing Science and Engineering, Precision Engineering (2014-2017). Advaned Optical Technologies (2018-). Advising board, International Journal of Extreme Manufacturing (2023-)*

h. Thesis Advisor to Graduate Students (15 Ph.D.s graduated)

Anurag Jain (Ph.D. Manufacturing Engineering, June, 2006, senor engineer at Corning Inc.). Chunning Huang (Ph.D., Manufacturing Engineering, August, 2008, Johnson & Johnson). Yang Chen (Ph.D. Manufacturing Engineering, 2009, Staff member at NanoPrecision). Lei Li (Ph.D. Manufacturing Engineering, 2009, senior engineering at Corning). Lijuan Su (Ph.D., Manufacturing Engineering, 2010, Associate Professor at Beihang Aerospace and Aeronautics University, Beijing). Hao Zhang (Ph.D., Manufacturing, 2013, Alcon Laboratories, Inc.). Peng He, Likai Li (Ph.D. Manufacturing Engineering, 2014, Apple). Hui Li (Ph.D. Manufacturing Engineering, 2016, Apple). Neil J. Naples (Ph.D. Manufacturing Engineering, 2018, Amtek Precitech, New Hamphire). Amin Moghaddas (Ph.D. Manufacturing, August 2018, Edision Welding Institute), Lin Zhang (Ph.D. Manufacturing Engineering, 2019, professor, Jilin University of Technology, Changchu). Wenchen Zhou (Ph.D. Manufacturing, Dec 2020, Huawei), Abolfazl Zolfaghari (Ph.D. Manufacturing, May 2021, TLA) Tiantong Che, Ph.D. Manufacturing, May 2023, Shunyu Inc.)