Hyung D. Bae

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I. Education

B.S., Mechanical Engineering, Yonsei University, Seoul, Korea, 2004
M.S., Mechanical Engineering, Yonsei University, Seoul, Korea, 2006
PhD, Mechanical Engineering, University of Maryland, College Park, Maryland, 2013

II. Research and Teaching Interests (list current research and teaching major areas of interest)

Research interests: Micro/nano fabrication, chip-scale optofluidics, and multi-functional fiber optic sensors (temperature, pressure, strain, and chemical sensing for biomedical applications)
Teaching interests: Microfabrication/micromachining, manufacturing process, machine design, CAD, CAE, sensors and transducers, biomedical sensors, and fiber optic sensors

III. Fellowships, Honors and Awards

DARPA Young Faculty Award, 2018
IEEE/OSA Journal Top Reviewer Award, 2017
Invention Disclosure Finalist, University of Maryland, 2012
A. James Clark Fellowship, School of Engineering, University of Maryland 2008-2011
First Place Award in the 1st Creative Design Contest, School of Engineering, Yonsei University, Seoul, Korea 2003
Merit-based scholarship, Department of Mechanical Engineering, Chungnam National University, Daejeon, Korea, 2001

IV. Professional Positions

2016 – Present, Assistant Professor of Mechanical Engineering, Howard University
2013 – 2016, Research Associate of Mechanical Engineering, University of Maryland
2016 – 2016, Chief Researcher, MedSense LLC, Maryland, USA
2008 – 2013, Graduate Research Assistant of Mechanical Engineering, University of Maryland
2004 – 2007, Graduate Research Assistant of Mechanical Engineering, Yonsei University, Seoul, Korea

V. Publications

A. Books and Book Chapters

B. Refereed Journal Articles

Refereed Articles

1. S. Tabtabaei, A. Rajabzadeh, and **H. Bae**, "Separation of protein particles based on charge density and particle size" (under preparation)
2. H. Bae, Bibek Ramdam, and Donipolo Ghimire, "Numerical simulation on surface relief FBG sensors for multi-parameter sensing", Sensors Journal, (under preparation)
3. K. Rajasekaran, **H. Bae**, A. Castro, M. Yu, and P. Abshire, "Bat hair inspired air flow sensor based on flexible polymer diaphragm and hair structure", Applied Physics Letter (**under preparation with University of Maryland groups**, impact factor: 3.411)
4. **H. Bae**, A. Giri, O. Kolawole, A. Azimi, G. Harris, A. Jackson (2019) "Miniature Diamond-Based Fiber Optic Pressure Sensor with Dual Polymer-Ceramic Adhesives", Sensors Journal, Volume 19, Issue 9, pp. 2202, https://doi.org/10.3390/s19092202 (impact factor: 3.031)
5. Q. Dong, **H. Bae**, Z. Zhang, Y. Chen, Z. Wen, D. A. Olson, M. Yu, H. Liu (2019) "Miniature fiber optic acoustic pressure sensors with air-backed graphene diaphragms", Journal of Vibration and Acoustics, Volume 141, Issue 4, pp. 041003, DOI: 10.1115/1.4042929 (impact factor: 1.929)
6. J. Ma, M. Zhao, X. Huang, **H. Bae**, Y. Chen, M. Yu (2016) "Low cost, high performance white-light fiber-optic hydrophone system with a trackable working point", Optics Express, Vol. 24, Issue 17, pp. 19008-19019, DOI: https://doi.org/10.1364/OE.24.019008 (impact factor = 3.307)
7. J. Ma, X. Huang, **H. Bae**, Y. Zheng, C. Liu, M. Zhao, and M. Yu (2016) "Liquid Viscosity Measurement Using a Vibrating Flexure Hinged Structure and a Fiber-Optic Sensor", IEEE Sensors, Vol. 16, Issue 13, pp. 5249-5258, DOI: 10.1109/JSEN.2016.2562740 (impact factor = 1.889)
8. R. Ganye, Y. Chen, H. Liu, **H. Bae**, Z. Wen, M. Yu (2016) "Characterization of wave physics in acoustic metamaterials using a fiber optic point detector", Applied Physics Letters, Vol. 108, Issue 26, pp. 261906, DOI: http://dx.doi.org/10.1063/1.4955058 (impact factor = 3.142)
9. Z. Zhang, Y. Chen, H. Liu, **H. Bae**, D. A. Olson, A. K. Gupta, M. Yu (2015) "On-Fiber Plasmonic Interferometer for Multi-Parameter Sensing," Optics Express, Vol. 8, Issue 5, pp. 10732-10740, DOI: https://doi.org/10.1364/OE.23.010732 (impact factor = 3.148)
10. Y. Chen, H. Liu, M. Reilly, **H. Bae**, M. Yu (2014) "Enhanced acoustic sensing through wave compression and pressure amplification in anisotropic metamaterials," Nature Communications, 5, Article number: 5247, DOI: 10.1038/ncomms6247 (impact factor = 11.329)
11. H. Kim, **H. Bae**, Z. Zhang , A. Kusimo, M. Yu (2014) "Optofluidic microvalve-on-a-chip with a surface plasmon-enhanced fiber optic microheater," Biomicrofluidics, Vol. 8, Issue 5, pp. 054126, DOI: http://dx.doi.org/10.1063/1.4900978 (impact factor = 3.357)
12. **H. Bae**, D. Yun, H. Liu, D. A. Olson, M. Yu (2014) "Hybrid Miniature Fabry–Perot Sensor with Dual Optical Cavities for Simultaneous Pressure and Temperature Measurements," J. Lightwave Technol., Vol. 32, Issue 8, pp. 1585-1593 (impact factor = 2.567)
13. C. Pang, **H. Bae**, M. Yu, A.K. Gupta, M. Bryden (2013) "MEMS Fabry-Perot Sensor Interrogated by Optical System-On-A-Chip for Simultaneous Pressure and Temperature

Sensing," Opt. Express, Vol. 21, Issue 19, pp. 21829-21839, DOI: https://doi.org/10.1364/OE.21.021829 (impact factor = 3.307)
14. **H. Bae** and M. Yu, (2012) "Miniature Fabry-Perot pressure sensor created by using UV-molding process with an optical fiber based mold," Opt. Express, Vol. 20, Issue 13, pp. 14573-14583, DOI: https://doi.org/10.1364/OE.20.014573 (impact factor = 3.307)
15. **H. Bae**, L. Dunlap, J. Wong, and M. Yu (2012) "Miniature Temperature Compensated Fabry – Perot Pressure Sensors Created With Self-Aligned Polymer Photolithography Process," IEEE Sensors, Vol. 12, Issue 5, pp. 1566–1573, DOI: 10.1109/JSEN.2011.2174439 (impact factor = 1.889)
16. **H. Bae**, X. M. Zhang, H. Liu, and M. Yu (2010) "Miniature surface-mountable Fabry-Perot pressure sensor constructed with a 45° angled fiber," Opt. Lett., Vol. 35, Issue 10, 1701–1703, DOI: https://doi.org/10.1364/OL.35.001701 (impact factor = 3.416)
17. X. M. Zhang, Y. Liu, **H. Bae**, C. Pang, and M. Yu (2009) "Phase modulation with micromachined resonant mirrors for low-coherence fiber-tip pressure sensors," Optics express, Vol. 17, Issue 26, pp. 23965–23974, DOI: https://doi.org/10.1364/OE.17.023965 (impact factor = 3.307)
18. S. H. Ahn, M. S. Choi, **H. D. Bae**, J. S. Lim, H. Myung, H. M. Kim, and S. I. Kang (2007) "Design and Fabrication of Micro Optical Film by UV Ultraviolet Roll Imprinting," Japanese Journal of Applied Physics, Vol. 46, Issue 8B, pp. 5478-5484 (impact factor = 1.122)

Refereed Proceedings and Presentations

1. K. Rajasekaran, **H. Bae**, S. Bergbreiter, M. Yu, "3D Printed Bio-Inspired Hair Sensor for Directional Airflow Sensing", 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020), to be held in Las Vegas, NV, USA, on October 25-29, 2020 (pending decision)
2. N. Yilmaz, **H. Bae**, "Implementation of Computer Aided Engineering in an Undergraduate Curriculum", ASEE North Central Section 2020 Conference, 20/20: Envisioning the Future of Engineering Education, March 27-28, 2020, Morgantown, WV.
3. A. Castro, **H. Bae**, M. Yu, P. Abshire (2016) "Bat-inspired hair sensor", Biomedical Circuits and Systems Conference (BioCAS), 2016 IEEE, 556-559
4. Z. Zhang, H. Liu, **H. Bae**, D. A. Olson, A. K. Gupta, M. Yu (2015) "Ultra-Thin Multi-Parameter Sensor Achieved with on-Fiber Plasmonic Interferometer", Frontiers in Optics, FTh3E. 4, DOI: https://doi.org/10.1364/FIO.2015.FTh3E.4
5. Z. Zhang, **H. Bae**, T. Nagaya, Y. Nakamura, P. Choyke, H. Kobayashi, M. Yu (2015) "In Vivo Pressure and Temperature Monitoring during Near Infrared Photo-Immunotherapy Using a Fiber Optic Sensor", Frontiers in Optics, FTh2E. 2, DOI: https://doi.org/10.1364/FIO.2015.FTh2E.2
6. **H. Bae** and M. Yu (2014) "Miniature polymer Fabry-Perot sensor with polymer dual optical cavities for simultaneous pressure and temperature measurements," Proc. SPIE 9112, Sensing Technologies for Global Health, Military Medicine, and Environmental Monitoring IV, 911218, DOI: 10.1117/12.2053568
7. **H. Bae** and M. Yu (2011) "Investigation of miniature fiber optic surface-mountable Fabry-Perot pressure sensor built on 45° angled fiber," In Proc. SPIE 7981, Sensors and

Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, pp. 79812X–79812X–7, DOI: 10.1117/12.880955

8. X. M. Zhang, M. Yu, S. Nesson, **H. Bae**, A. Christian, A. Q. Liu (2009) "Micromachined Pressure Sensors on Optical Fiber Tip," Advanced Materials Research, 74, 149-152
9. S. M. Kim, J. S. Kim, **H. D. Bae**, H. M. Kim, S. I. Kang, J. G. Kim, S. K. Lee, H. Kim, Y. H. Bae (2006) "Nano imprinting of conductive tracks using sintering of metal nano powders" Nanoimprint and Nanoprint Technology Conference(NNT'06), pp. 79-80, November 15-17
10. H. M. Kim, S. M. Kim, J. S. Lim, **H. D. Bae**, S. I. Kang (2005) "Fabrication of optical probe array using microlens illuminated aperture array", Proceedings of Nanoengineering Symposium 2005, pp. 240-244, October 26-28
11. **H. D. Bae**, M. S. Choi, S. I. Kang (2006) "Optimization of Glass Micro Molding Process for Glass Microlens Arrays," Journal of The Society of Information Storage Systems, 2(4), 236-239
12. **H. D. Bae**, J. S. Lim, K. B. Jung, J. W. Han, J. M. Yoo, N. C. Park, S. I. Kang (2006) "Fabrication of Diffractive Optical Element for Objective Lens of Small Form Factor Data Storage Device," Transactions of Material Processing, 15(1)
13. J. W. Cha, S. H. Ahn, J. W. Han, **H. D. Bae**, H. Myung, S. I. Kang (2006) "Development of continuous UV nano imprinting process using pattern roll stamper," Proceedings of the KSPE (Korean Society for Technology of Plasticity) Annual Spring 2006
14. J. S. Kim, H. K. Kim, J. S. Lim, **H. D. Bae**, M. S. Choi (2007) "Development of Metal nano Powder Imprinting Process for Fabrication of Conductive Tracks," Proceedings of the KSPE (Korean Society for Technology of Plasticity) Annual Spring 2007

C. Non-refereed Publications

1. Celecia Blyden and Hyung Bae, "Simulating Surface Enhanced Raman Spectroscopy Using COMSOL Multiphysics", poster presentation during 2019 Howard University Research Week

D. Other Reports

Invention disclosure: High Temperature Heteroepitaxial Polycrystalline Diamond Fiber Optic Pressure and Temperature Sensor (2017 September)

Patent: Ultra-miniature fiber-optic pressure sensor system and method of fabrication M. Yu, H. Bae, X. Zhang, US Patent 8,151,648

VI. Teaching and Advising

A. Courses Taught

MEEG350-01 2020 Spring, Computer Aided Engineering (3 cr)
Enrollment: 29
Course evaluation rating (average): 4.68 (course), 4.67 (instructor), 3.85 (college specific), & 3.41 (COVID-19)

MEEG103-01 & 02 2020 Spring, Intro to CAD (2 cr)
Enrollment: 46

Course evaluation rating (average): 4.13 (course), 4.11 (instructor), 3.93 (college specific), & 2.98 (COVID-19)

MEEG421-01 2019 Fall, Product Data Management (3 cr)
Enrollment: 6
Course evaluation rating (average): 4.22 (course) & 4.38 (instructor)

MEEG536-01 2019 Fall, Product Data Management (3 cr)
Enrollment: 2
Course evaluation rating (average): 5.00 (course) & 5.00 (instructor)

MEEG311-01 2019 Spring, Mechanical Design II (3 cr)
Enrollment: 20
IDEA rating:

MEEG455-01 2019 Spring, Undergraduate Research I (3 cr)
Enrollment: 1
IDEA rating:

MEEG416-01 2018 Fall, Aerostructures (3 cr)
Enrollment: 6
IDEA rating:

MEEG103-01 & 02 2018 Fall, Introduction to CAD (2 cr)
Enrollment: 30
IDEA rating:

MEEG455-01 2018 Fall, Undergraduate Research I (3 cr)
Enrollment: 1
IDEA rating:

MEEG311-01 2018 Spring, Mechanical Design II (3 cr)
Enrollment: 20
IDEA rating:

MEEG201-01 2018 Spring, Manufacturing Processes Lab (1 cr)
Enrollment: 19
IDEA rating:

MEEG103-01 & 02 2017 Fall, Introduction to CAD (2 cr)
Enrollment: 51
IDEA rating:

MEEG102-01 & 02 2017 Spring Introduction to Engineering II (2 cr)
Enrollment: 31
IDEA rating:

MEEG103-01, 02, & 03 2016 Fall, Introduction to CAD (2 cr)
Enrollment: 39
IDEA rating:

B. Curriculum Development and other Pedagogical Activities

C. Theses: Primary Advisor

1. Masters Students

2. Doctoral Students:
    a. Amin Azimi (2016 Fall ~ 2017 Spring)
    b. Venkata Ravichandra Rayudu Yadavalli (2018 Fall ~ 2019 Spring)
    c. Bibek Ramdam (2019 Fall ~ present)

D. Theses: Non-Primary Advisor

1. Masters Students
    a. Rasheed Yinusa (2018 Winter ~ 2017 Spring)

2. Doctoral Students
    a. Moses Ukaoma (2018 Fall ~ present)
    b. Alejandro Pardo Ramos (2020 Spring ~ present)

VII. External Research and Scholarly Activities

A. Proposals Submitted

Proposal Title	PI/coPI	Agency	Amount	Date Submitted
White paper: Distributed Fiber Optic Chemical Sensors and Multiplexed Optical System for Small Drone Application	PI	Department of the Army through MSRDC	$250,000	Feb 2017 Nov 2016
Miniature Stiffness Imaging Fiber Optic Probe for In Situ Colon Cancer Screening	PI	NIH R21 through RCMI	$334,661	Sep 2017
Polymer based replicated multi-modal fiber Bragg grating (FBG) for Fentanyl detection	PI	DARPA (Young Faculty Award)	$360,000	Dec 2017

Understanding Interactions of Gold and Silver Nanoparticles with Proteins to Achieve Optimum Surface Plasmon Effect	Co-PI	NSF EiR	$786,179	Mar 2018
An Interdisciplinary Collaboration for an Application-Specific FPGA-based UAV Wildfire Environments	Co-PI	NSF EiR	$2,209,031	Mar 2018
White paper: IR transmitting and ultrahigh refractive index polymer based microlens array for focal plane array	PI	MSA (Missile Defense Agency)	$760,459	April 2018
A Smart and Impervious Polymer Nanocomposite for Enhanced Habitability and Structural Health Monitoring of Buildings	Co-PI	NSF	$414,810	May 2019
Additive Manufacturing Post-Processing Partnership (AMP^3)	Co-PI	DOE	$750,000	March 2019
Machine leaning and AI Center	Co-PI	DoD	TBD	June 2020 (under preparation)

B. Funded Proposals

Proposal Title	PI/coPI	Agency	Amount	Dates
Polymer based replicated multi-modal fiber Bragg grating (FBG) for Fentanyl detection	PI	DARPA	$339,839	July 2018 – June 2020
Understanding Interactions of Gold and Silver Nanoparticles with Proteins to Achieve Optimum Surface Plasmon Effect	Co-PI	NSF EiR	$786,178	August 2018 – July 2021
Additive Manufacturing Post-Processing Partnership (AMP^3)	Co-PI	DOE	$750,000	August 2019 - July 2022

VIII. Service

A. University-Wide

B. College-Wide

1. CEA Online course delivery trainings for CEA faculties (March 2020)
2. Advisor of Sigma Phi Delta (August 2020 – present)
3. CEA Education service committee (Spring 2020 - present)
4. Research advisor for Howard University Robotics Organization (HURO) (August 2018 - present)
5. Research advisor for Graphone team, interdisciplinary senior project team for development of graphene based miniature microphone (August 2018 - May 2019)
6. Served as a judge for ASME Matlab Hackathon using Fusion 360 (10/17/2018)
7. Department representative during open house event at the Crampton Auditorium (10/13/2018)
8. Served as a judge for AfroHacks organized by CEA students (3/3/2018)
9. Chemical Engineering Faculty Search Committee, November 2016 – April 2017
10. Grievance committee regarding an academic infraction, May 2017

C. Departmental

1. Freshmen Academic Advisor, Aug 2019 - present
2. Ad-Hoc Committee for ABET, Aug 2017 – present
3. Senior Capstone Project Judge (2017 Spring)
4. Department Chair Search Committee, Nov 2016 – Dec 2016
5. Educational Policy and Service Committee, Sept 2016 – Present

D. National and International

1. Autodesk Generative Design with Fusion 360 certification exam review, May – June 2020
2. Autodesk CAD for Mechanical Design with Fusion 360 certification exam review, April – May 2020
3. National Defense Science & Engineering Graduate (NDESG) Fellowship Panel, Dec 2019 – Jan 2020
4. NSF Panel, Dec 2018 - Jan 2019
5. National Defense Science & Engineering Graduate (NDESG) Fellowship Panel, Dec 2018 – Jan 2019
6. NSF Panel, Dec 2017 - Jan 2018
7. Science, Mathematics, & Research for Transformation (SMART) Scholarship Panel, Jan 2018 - Feb 2018
8. 2018 PACE forum student team support (Warren MI, July 2018)
9. 2018 PACE forum student team support (Toluca, Mexico, July 2018)
10. Journal paper review (2019 - 2020): JLT, manuscript ID: 26034-2020
11. Journal paper review (2019 - 2020): Coatings, manuscript ID: 746096
12. Journal paper review (2019 - 2020): Marinedrugs, manuscript ID: 581814

13. Journal paper review (2019 - 2020): Materials, manuscript ID: 747156 and 780006
14. Journal paper review (2019 - 2020): Biomedical optics express, manuscript ID: 391980
15. Journal paper review (2019 - 2020): Optics letters, manuscript ID: 381452 and 386798
16. Journal paper review (2019 - 2020): Micromachines, manuscript ID: 650773 and 697545
17. Journal paper review (2019 - 2020): IEEE Access, manuscript ID: 2019-18493
18. Journal paper review (2019 - 2020): Sensors Journal, manuscript ID: 55932, 558365, 604077, 607493, 647352, 675480, and 811180
19. Journal paper review (2019): Sensors Journal, manuscript ID: 479744
20. Journal paper review (2019): Sensors Journal, manuscript ID: 461051
21. Journal paper review (2019): IEEE Sensors Journal, manuscript ID: 25681-2019
22. Journal paper review (2019): Materials Journal, manuscript ID: 452140
23. Journal paper review (2019): Sensors Journal, manuscript ID: 443635
24. Journal paper review (2018): IEEE Sensors Journal, manuscript ID: 24654-2018
25. Journal paper review (2018): Sensors Journal, manuscript ID: 24529-2018
26. Journal paper review (2018): IEEE Sensors Journal, manuscript ID: 24503-2018
27. Journal paper review (2018): Journal of Lightwave Technology, manuscript ID: 23243-2018
28. Journal paper review (2018): Applied Science, manuscript ID: 404131
29. Journal paper review (2018): IEEE Sensors Journal, manuscript ID: 23805-2018
30. Journal paper review (2018): Optics Express, manuscript ID: 348712
31. Journal paper review (2018): Sensors Journal, manuscript ID: 389708
32. Journal paper review (2018): Sensors Journal, manuscript ID: 23805-2018
33. Journal paper review (2018): Sensors Journal, manuscript ID: 373411
34. Journal paper review (2018): Journal of Lightwave Technology, manuscript ID: JLT-22752-2018
35. Journal paper review (2018): Micromachines, manuscript ID: 341359
36. Journal paper review (2018): Sensors Journal, manuscript ID: 22773-2018
37. Journal paper review (2018): Optics Communication, manuscript ID: MK-1517
38. Journal paper review (2018): Fibers Journal, manuscript ID: 340962
39. Journal paper review (2018): Fibers Journal, manuscript ID: 322467
40. Journal paper review (2018): IEEE Sensors Journal, manuscript ID: 22048-2018
41. Journal paper review (2018): Sensors Journal, manuscript ID: 303102
42. Journal paper review (2018): Journal of Lightwave Technology, manuscript ID: JLT-22269-2018
43. Journal paper review (2018): Sensors Journal, manuscript ID: 278053
44. Journal paper review (2018): Sensors Journal, manuscript ID: 274465
45. Journal paper review (2018): Sensors Journal, manuscript ID: 278053
46. Journal paper review (2018): Fibers Journal of Micro/Nanolithography, MEMS, and MOEMS, manuscript ID: 206422
47. Journal paper review (2018): Fibers Journal, manuscript ID: 262624
48. Journal paper review (2017): Optical Communications Journal, manuscript ID: LC-2326
49. Journal paper review (2017): Journal of Lightwave Technology, manuscript ID: JLT-21025-2017
50. Journal paper review (2017): Sensors Journal, manuscript ID: 237303
51. Journal paper review (2017): Journal of Lightwave Technology: manuscript ID: JLT-21167-2017

52. Journal paper review (2017): IEEE Sensors Journal, manuscript ID: 19401-2017
53. Journal paper review (2017): Sensors Journal, manuscript ID: 230697
54. Journal paper review (2017): Journal of Lightwave Technology: manuscript ID: JLT-21127-2017
55. Journal paper review (2017): ACS Applied Materials & Interfaces, manuscript ID: am-2017-133568
56. Journal paper review (2017): Journal of Lightwave Technology: manuscript ID: JLT-21025-2017
57. Journal paper review (2017): Sensors Journal, manuscript ID: 220926
58. Journal paper review (2017): Sensors Journal, manuscript ID: 202883
59. Journal paper review (2017): Sensors Journal, manuscript ID: 193515
60. Journal paper review (2017): Journal of Lightwave Technology: manuscript ID: JLT-20476-2017
61. Journal paper review (2016): Sensors Journal, manuscript ID: 149420

E. Other

IX. Professional Development Activities

A. Professional Membership

1. American Society of Mechanical Engineers (ASME)
2. The Optical Society (OSA)

B. Professional Leadership

C. Professional Workshop/training

1. Comsol Online Training: RF and Wave Optics Modeling (May 19 – 22, 2020)
2. Blackboard and Distance Learning Certification at CETLA, Howard University (December, 2020)
3. Autodesk University 2019 Conference, Las Vegas (November 19-21, 2020).
4. Autodesk Fusion 360 Generative Design training at Howard University (April 12, 2019)
5. Autodesk Fusion 360 Computer Aided Manufacturing training at Howard University (May 29, 2019)
6. DARPA ERI (Electronic Resurgence Initiative) Summit (July 15-17, 2019, Detroit, MI)