



# INTERDISCIPLINARY MICROSYSTEMS GROUP

## ANNUAL REPORT 2017

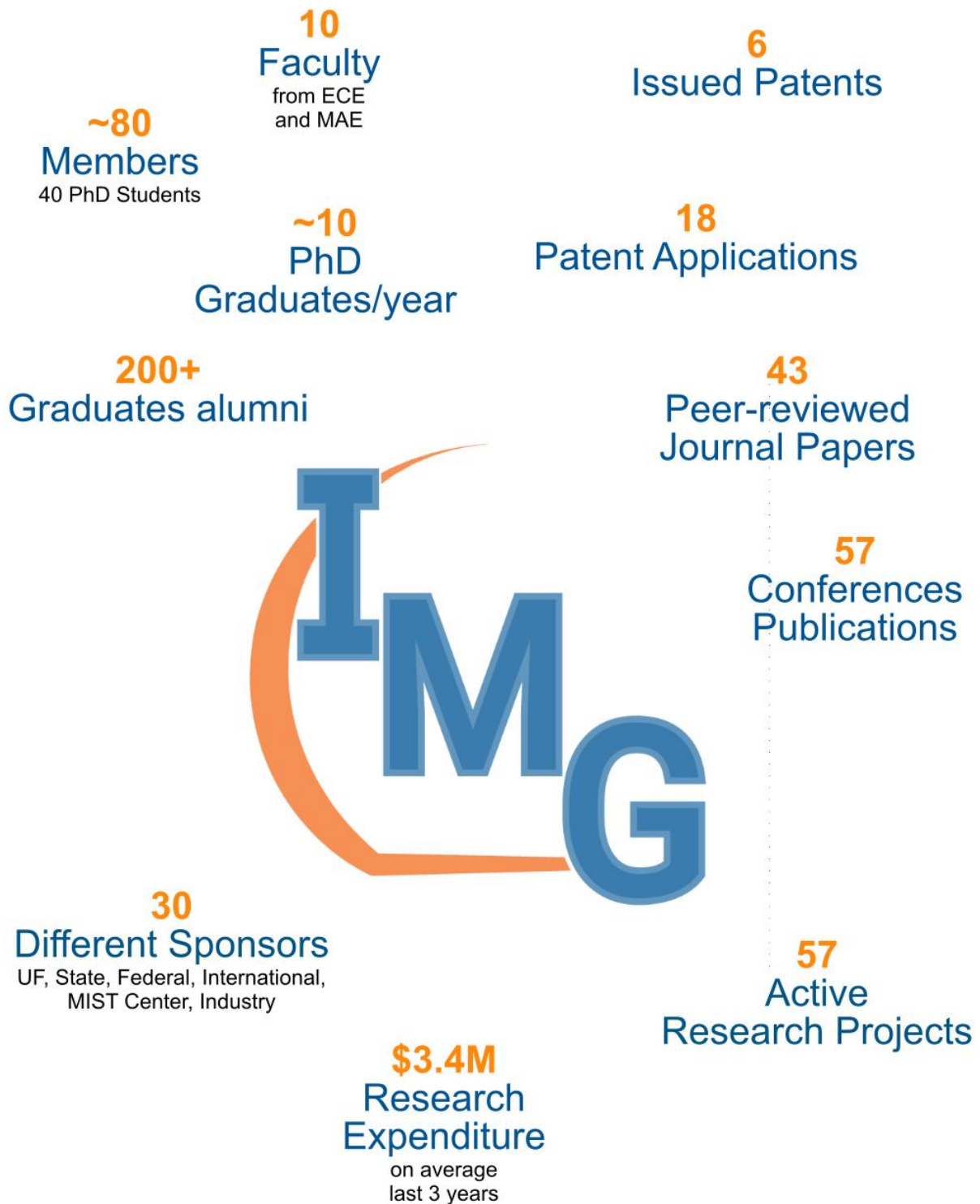


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## 2017 Key Figures



## Introduction

The Interdisciplinary Microsystems Group (IMG) is a college-wide multi-departmental education and research program of the College of Engineering at the University of Florida. IMG operates under the direction of Mark Sheplak, Hugh Fan, and Saeed Moghaddam of the Department of Mechanical and Aerospace Engineering and Toshikazu Nishida, Huikai Xie, David Arnold, Y.K. Yoon, Jack Judy, Roozbeh Tabrizian and Alexandra Garraud of the Department of Electrical and Computer Engineering.

IMG research focuses on micro- and nanosystems for healthcare, energy, security, aerospace, transportation, consumer electronics, and other industries. Efforts include design, fabrication, characterization, and ultimately deployment of micro and nanotechnologies for a wide variety of applications.

Founded in 1998, IMG has steadily grown in size, scope, and impact. Since its inception, IMG faculty have participated in 289 sponsored research projects valued at \$95M (IMG portion was \$51M). Of these, 228 projects (79%) were led by an IMG faculty member as PI, and 71 (25%) included more than one IMG investigator.

Over the past three years (2015-2017), IMG has collectively averaged \$3.4M/year in budgeted research, 33 journal publications/year and 37 conference papers/year, along with 10 graduated PhD students/year. IMG has a diverse track record of fundamental and applied research for government, defense, and industry sponsors. IMG's research and graduate/undergraduate student training record have been fueled by true interdisciplinary research and strong internal and external collaborations.



## Faculty Spotlight

### David P. Arnold

#### *Professor*

David P. Arnold is the George Kirkland Engineering Leadership professor in the Dept. of Electrical and Computer Engineering at the University of Florida. He also holds an affiliate appointment in the Dept. of Materials Science and Engineering. He is currently Director of the Interdisciplinary Microsystems Group (IMG) and also Deputy Director of the NSF Multi-functional Integrated System Technology (MIST) Center.



He received dual B.S. degrees in electrical and computer engineering in 1999, followed by the M.S. degree in electrical engineering in 2001, from the University of Florida, Gainesville. He received the Ph.D. degree in electrical engineering at the Georgia Institute of Technology, Atlanta in 2004. His research focuses on magnetic thin/thick films and magnetic micro/nanostructures; magnetic microsystems and electromechanical transducers; and compact (<100 W) power/energy systems.

Dr. Arnold is an active participant in the magnetics and MEMS communities, serving on conference committees for the MEMS, PowerMEMS, Hilton Head, Transducers, Sensors, MMM, and Intermag meetings. He was the technical program co-chair of the 2009 PowerMEMS and is currently on the editorial board of J. Micromechanics and Microengineering and Energy Harvesting and Systems. His work has been recognized with several prestigious awards, including the 2008 Presidential Early Career Award in Science and Engineering (PECASE) and the 2009 DARPA Young Faculty Award. Dr. Arnold is the current UF chapter faculty advisor and member of the Eta Kappa Nu ECE engineering honor society. He is also a Senior Member of IEEE and a member of Tau Beta Pi.

Beyond his passion for research and teaching, he most enjoys spending time with his wife and three children.

#### *Education*

Graduation Year	Degree	University	Program of study
2004	Doctorate	Georgia Institute of Technology	Electrical Engineering
2001	Master of Science	University of Florida	Electrical and Computer Engineering
1999	Bachelor of Science	University of Florida	Electrical Engineering
1999	Bachelor of Science	University of Florida	Computer Engineering



## Z. Hugh Fan

### *Professor*

Dr. Hugh Fan is the George N Sandor Faculty fellow and professor of the Department of Mechanical and Aerospace Engineering, J Crayton Pruitt Family Department of Biomedical Engineering, and Department of Chemistry at the University of Florida (UF). He was an E.T.S. Walton visiting professor in Biomedical Diagnostics Institute at Dublin City University, Ireland in 2009. Prior to joining UF in 2003, Dr. Fan was a Principal Scientist at ACLARA BioSciences Inc. (Mountain View, CA) and was previously a Member of the Technical Staff at Sarnoff Corp. (Princeton, NJ).



Dr. Fan's research interests include microfluidics, BioMEMS (Bio-medical MicroElectroMechanical Systems), sensors, and bioengineering. His research focus is to develop microfluidics and BioMEMS technologies and apply them to biological applications. Microfluidics is promising to reach the holy grail of "lab-on-a-chip". In analogy to shrinking a computer from the size of a room in the 1950s to a laptop today, instruments for chemical and biological analyses may be miniaturized using modern microfabrication technology. Potential applications of the portable, miniaturized devices may include point-of-care testing (e.g., in emergency rooms), environmental monitoring, and detection of biowarfare agents in the field.

Dr. Fan is a recipient of Fraunhofer-Bessel Research Award from Alexander von Humboldt Foundation. He is a Fellow of the American Association for the Advancement of Science (AAAS) and the American Society of Mechanical Engineers (ASME), an editor of *Microsystems and Nanoengineering* (Nature Publishing Group), and an editorial board member of *Scientific Report* (Nature Publishing Group). He received his B. Sc. from Yangzhou Teachers' College (now a part of Yangzhou University) in China and his Ph.D. from the University of Alberta in Canada. Dr. Fan worked as a postdoctoral fellow at Ames Laboratory of US Department of Energy at Iowa State University. He joined UF in 2003 after more than eight years of industrial experience.

### *Education*

Graduation Year	Degree	University	Program of study
1994	Doctorate	University of Alberta	Chemistry
1985	Bachelor	Yangzhou Teachers' College	Chemistry

## Alexandra Garraud

### *Research Assistant Professor*

Alexandra Garraud is currently a research assistant professor in the Electrical and Computer Engineering department at the University of Florida. Her research interests include the fabrication, the development and the characterization of ferromagnetic and ferroelectric materials and microsystems for power and low-power memories applications.

She received the B.S. degree in electrical engineering in 2005, and the M.S. degree in applied physics in 2008, from ENS Cachan and Paris-Sud University (France). She received the Ph.D. degree in electrical engineering from Montpellier 2 University (France) in 2011, with a support from a ENS Cachan fellowship.

During her postdoctoral position, from 2012 to 2015, in the Electrical and Computer Engineering and the Biomedical Engineering departments, she has acquired significant multidisciplinary experience by working on multiple sponsored research projects (particle beam physics, biomedical engineering).



### *Education*

Graduation Year	Degree	University	Program of study
2011	Doctorate	Montpellier University	Electrical Engineering
2008	Master of Science	Paris-Sud University	Electrical Engineering
2005	Bachelor of Science	Paris-Sud University	Electrical Engineering



## Jack Judy

### *Professor*

Dr. Jack Judy is the Intel Endowed Chair of Nanotechnology and the Director of the Nanoscience Institute for Medical and Engineering Technology. Dr. Judy was formerly a program manager in the Microsystems Technology Office of the Defense Advanced Research Projects Agency (DARPA) and Professor at UCLA. While at UCLA, he served as Director of the NeuroEngineering Program, the Nanoelectronics Research Facility, and the Microfabrication Laboratory. Dr. Judy has received the prestigious National Science Foundation Career Award and the Okawa Foundation Award. He received his B.S.E.E. degree with summa cum laude honors from the University of Minnesota in 1989, and an M.S. and Ph.D. from the University of California, Berkeley, in 1994 and 1996, respectively.



### *Education*

Graduation Year	Degree	University	Program of study
1996	Doctorate	University of California, Berkeley	Electrical Engineering
1994	Master of Engineering	University of California, Berkeley	Electrical Engineering
1989	Bachelor of Science	University of Minnesota	Electrical Engineering

## Saeed Moghaddam

### *Associate Professor*

Saeed Moghaddam, Ph.D., is an Assistant Professor in University of Florida. Before joining the University of Florida in 2010, he was a postdoc (2007-2010) in Chemical and Biomolecular Engineering Department at University of Illinois at Urbana-Champaign. His research is focused on micro/nanoscale transport and nanotechnology. His major contributions to science and technology are: demonstration of membrane-based absorption/desorption cycle with a significantly higher performance compare to the existing technologies; the most detailed physical insight, over nearly a century of nucleate boiling science, on the nature of thermal field at the bubble-surface interface; development of the first Si-based proton exchange membrane (PEM) capable of operating at dry ambient; and development of the world's smallest fuel cell. Dr. Moghaddam earned his PhD from the University of Maryland at College Park in 2006.



### *Education*

Graduation Year	Degree	University	Program of study
2006	Doctorate	University of Maryland at College Park	Mechanical Engineering

## Toshikazu (Toshi) Nishida

### *Professor*

Dr. Nishida's research interests include the development of reliable, high performance, multi-functional semiconductor devices, sensors, and actuators for microsystems employing strained Si, SiGe, GaN, ferroelectrics, and polymers and enabling multi-functional integrated system technology for smart systems.

Dr. Nishida received his Ph.D. (1988) and M.S. degrees in Electrical and Computer engineering and B.S. degree in Engineering physics at the University of Illinois at Urbana-Champaign. With colleagues and students, he has published over 150 refereed journal and conference papers and received three best paper awards. He also received the 2003 College of Engineering Teacher of the Year award. He holds 11 U.S. patents. He is a distinguished lecturer for the IEEE Electron Devices Society and a senior member of IEEE.



### *Education*

Graduation Year	Degree	University	Program of study
1988	Doctorate	University of Illinois at Urbana-Champaign	Electrical and Computer Engineering
1985	Master of Science	University of Illinois at Urbana-Champaign	Electrical and Computer Engineering
1983	Bachelor of Science	University of Illinois at Urbana-Champaign	Electrical Engineering

## Mark Sheplak

### *Professor*

Mark Sheplak is currently a Professor holding joint appointments in the Department of Mechanical and Aerospace Engineering and the Department of Electrical and Computer Engineering at the University of Florida. Prior to joining UF in 1998, he was a postdoctoral associate at the Massachusetts Institute of Technology's Microsystems Technology Laboratories, Cambridge, MA from 1995-1998. He received a BS degree in 1989, a MS degree in 1992, and a Ph.D. degree in 1995 in Mechanical Engineering from Syracuse University, Syracuse, NY. During his Ph.D. studies he was a GSRP Fellow at NASA-LaRC in Hampton, VA from 1992-1995. His current research focuses on the design, fabrication, and characterization of high-performance, instrumentation-grade, MEMS-based sensors and actuators that enable the measurement, modeling, and control of various physical properties. Specific applications include technology development to enable large-channel count micromachined directional microphone arrays for aeroacoustic noise source localization and miniature skin-friction sensors for aerodynamic drag characterization and flow control.



He is a member of the Multi-functional Integrated System Technology Center (MIST) and the Florida Center for Advanced Aero-Propulsion (FCAAP). He is member and past chair of the AIAA Aerodynamic Measurement Technology Technical Committee. He is also an associate editor for Journal of the Acoustical Society of America (JASA) and JASA Express Letters. He is an associate fellow of AIAA and a fellow of the Acoustical Society of America.

### *Education*

Graduation Year	Degree	University	Program of study
1995	Doctorate	Syracuse University	Mechanical Engineering
1992	Master of Science	Syracuse University	Mechanical Engineering
1989	Bachelor of Science	Syracuse University	Mechanical Engineering

## Roozbeh Tabrizian

### *Assistant Professor*

Roozbeh Tabrizian received his B.S. in Electrical Engineering from Sharif University of Technology, Tehran, Iran, in 2007, and Ph.D. in Electrical and Computer Engineering from Georgia Institute of Technology, 2013. In 2014, he joined the Department of Electrical Engineering, University of Michigan as a Postdoctoral research fellow. In August 2015, he joined the Department of Electrical and Computer Engineering, University of Florida as an Assistant Professor.

His research at the University of Florida involves linear and nonlinear phononic devices, RF MEMS, mixed-domain nanosystems for time keeping / transfer and memory applications, and secure M/NEMS sensors and identifiers.



Dr. Tabrizian is the recipient of NSF CAREER award (2018). His research has resulted in more than 40 journal and conference papers, 2 book chapters, 3 published patents and 10 patent applications. He and his students are the recipients of outstanding paper awards at the IEEE International Conference on Micro Electro Mechanical Systems (MEMS) and International Conference on Solid-State Sensors, Actuators, and Microsystems (Transducers).

### *Education*

Graduation Year	Degree	University	Program of study
<b>2013</b>	Doctorate	Georgia Institute of Technology	Electrical and Computer Engineering
<b>2007</b>	Bachelor of Science	Sharif University of Technology	Electrical Engineering

## Huikai Xie

### *Professor*

Dr. Huikai Xie is currently a professor at the Department of Electrical and Computer Engineering at the University of Florida. He is also an affiliate faculty of UF Biomedical Engineering Department and a member of the UF Shands Cancer Center. His research interests include MEMS/NEMS, microsensors, microactuators, CMOS-MEMS, integrated gyroscopes, integrated power passives, optical MEMS, microspectrometers, micro LiDAR, biophotonics, endomicroscopy, optical coherence tomography, and in vivo brain imaging. He has published over 280 referred journal and conference papers, and holds 16 issued US patents.



Dr. Xie received his BS and MS degrees in microelectronics from Beijing Institute of Technology, his MS degree in photonics from Tufts University, and his PhD degree in electrical and computer engineering from Carnegie Mellon University. Prior to joining UF in 2002, he worked as a research faculty at Tsinghua University (1992-1996), a summer intern at Bosch (2001), and Director of Engineering at Akustica Inc. (now part of Bosch) (2002). He also worked as a Summer Faculty Fellow at the Air Force Research Lab, Ohio (2007-2009). He is an editor for the IEEE Sensors Letters and the International Journal of Optomechatronics. He is a senior member of IEEE, OSA and SPIE.

### *Education*

Graduation Year	Degree	University	Program of study
2002	Doctorate	Carnegie Mellon University	Electrical and Computer Engineering
1998	Master of Science	Tufts University	Electro-Optics
1992	Master of Science	Beijing Institute of Technology	Electronic Engineering
1989	Bachelor of Science	Beijing Institute of Technology	Electronic Engineering



## Y.K. Yoon

### *Associate Professor*

YK Yoon is currently an Associate Professor in the Department of Electrical and Computer Engineering at the University of Florida, Gainesville, FL. His current research interests include three dimensional (3-D) micromachining and nano fabrication; design and implementation of metamaterial for radio frequency (RF) and microwave applications; micromachined millimeter wave and terahertz antennas and waveguides; bio/microfluidic systems for the lab-on-a-chip applications; wireless telemetry systems for biomedical applications; and ferroelectric material development for high density memory devices and/or tunable RF devices.



He received his BS and MS degrees in electrical engineering from Seoul National University in Korea. He also earned an MSEE degree from the New Jersey Institute of Technology, Newark, NJ in 1999 and the Ph.D. degree in electrical and computer engineering from the Georgia Institute of Technology, Atlanta, GA in 2004. He held a postdoctoral position in the Microelectronics Research Center of Georgia Institute of Technology from 2004 to 2006. In 2006, he joined the faculty of the University at Buffalo, the State University of New York as an Assistant Professor in the Department of Electrical Engineering, where he directed the Multidisciplinary nano and Microsystems (MnM) laboratory until 2010. He received the NSF Early Career Development Award (CAREER) in 2008 and the Young Investigator Award from the University at Buffalo in 2009. He has more than 90 peer reviewed publications. He is a member of IEEE society. He actively participates in multiple technical conferences including Microelectromechanical systems (MEMS), Transducers, Hilton Head, micro total analysis systems ( $\mu$ TAS), American Vacuum Society (AVS), International Microwave Symposium (IMS) and Antenna Propagation Symposium (APS).

### *Education*

Graduation Year	Degree	University	Program of study
2004	Doctorate	Georgia Institute of Technology	Electrical and Computer Engineering
1999	Master of Science	New Jersey Institute of Technology	Electrical and Computer Engineering
1994	Master of Science	Seoul National University	Electrical Engineering
1992	Bachelor of Science	Seoul National University	Electrical Engineering

## Finance

### State Sponsorship

Title of Grant	Funding Agency	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
Laminated Paper-based analytical Devices for Detecting Exposure to Secondhand smoke	FL Department of Health	\$125,000	\$68,986
Multiplexed Detection Platform for Point-of-Service Testing of Virus	FL Department of Health	\$181,513	\$43,251
University of Florida (UF) Testbed Initiative – Transit Components	FL Department of Transportation	\$112,447	\$31,537
<b>Total</b>		<b>\$418,960</b>	<b>\$143,774</b>

### Federal Sponsorship

Title of Grant	Funding Agency	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
Electromagnetic and Magnetic Penetration for High-Resolution Image Reconstruction	DARPA	\$16,542	\$0
Levitated Microfactories for High-speed Adaptive Microassembly	DARPA (through SRI Intl)	\$170,000	\$18,960
Magnetic Thick Films for Integrated Microwave Devices	DARPA	\$390,345	\$246,102
Tissue Engineered Electronic Neural Interface (TEENI)	DARPA	\$688,539	\$292,978
Rapid, Portable Detection of Coliforms and E. coli. in Drinking Water	Defense Health Agency	\$42,049	\$10,625
A Combined Water Heater, Dehumidifier and Cooler (WHDC)	DOE	\$802,000	\$109,774
AOI 3 – High-Temperature Sapphire Pressure Sensors for Ha	DOE	\$850,371	\$70,938
NIH R01: A Multimodal Imaging System and Targeted Nanoprobes for Image-Guided Treatment of Breast Cancer	NIH	\$90,919	\$2,799
Modeling of the Magnetic Particle Imaging Signal Due to Magnetic Nanoparticles	NIH	\$63,261	\$0
Plasma clearance of water soluble and albumin bound toxins using graphene oxide nanoengineered laminates	NIH	\$413,129	\$31,656

EAGER: Novel instrumentation for extracting and modeling of flow structure in turbulent boundary layers	NSF	\$69,205	\$8,477
Ferroelectric HfO <sub>2</sub> on Germanium Tunnel Junctions Towards Sub-Femto Joule Switching	NSF	\$293,203	\$75,372
IDBR Type A: High Efficiency and Rapid Viral Aerosol Detection System	NSF	\$174,036	\$32,750
I/UCRC – Participant Support Costs	NSF	\$24,000	\$7,778
I/UCRC Phase I: Multi-functional Integrated System Technology	NSF	\$705,000	\$176,154
MEMS-based Fiber-optic Two-photon Microscopy Probe for Real Time In vivo 3D Neural Imaging in Freely Behaving Animals	NSF	\$258,468	\$100,936
Probing interfacial phase-change transport events in flow boiling on micro- and nanotextured surfaces	NSF	\$306,019	\$131,508
Radiated Noise in a Jet	NSF	\$164,963	\$5,361
RI: Medium: Collaborative Research: Novel Depth Sensor D	NSF	\$205,703	\$62,424
SNM: Large-area Manufacturing of Integrated Devices with Nanocomposite Magnetic Cores	NSF	\$396,013	\$20,924
Ionic Liquid Membrane-Based Polymer Absorber	UT-Battelle	\$95,446	\$0
Physics of Ultrasonic Drying Process	UT-Battelle (through DOE)	\$176,733	\$21,396
<b>Total</b>		<b>\$6,395,944</b>	<b>\$1,426,912</b>

*Industry Sponsorship (including NSF I/UCRC MIST Center Sponsorship)*

Title of Grant	Funding Agency	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
Arnold MIST portion	Multiple Sponsors	\$164,607	\$2,041
Arnold MIST Portion (MIPR)	US Army – CERDEC	\$49,580	\$27,227
Fan MIST Portion	Multiple Sponsors	\$113,691	\$39,426
Garraud MIST Portion	Multiple Sponsors	\$37,500	\$0

<b>Moghaddam MIST Portion</b>	Multiple Sponsors	\$30,169	\$12,430
<b>Nishida MIST Portion</b>	Multiple Sponsors	\$132,091	\$29,220
<b>Sheplak MIST Portion</b>	Multiple Sponsors	\$675,951	\$121,330
<b>Yoon MIST Portion</b>	Multiple Sponsors	\$188,016	\$50,168
<b>Micro-Electrical-Mechanical Systems (MEMS) microphone</b>	Boeing	\$21,500	\$21,494
<b>Engineered silica for high-frequency circuit boards</b>	Corning	\$50,000	\$48,607
<b>Glass vs Incumbent Materials in RF Passives and Antenna</b>	Corning	\$96,830	\$4,225
<b>Sensor Technology Usage on Personal Items</b>	Discover Financial Services	\$40,735	\$274
<b>NASA SBIR Phase I - Fast Response, Fiber-Optic Micromachined Five-Hole Probe for Three-Dimensional Flows</b>	IC2	\$24,981	\$24,576
<b>NASA SBIR Phase I-High Channel Count, High Density Microphone Arrays for Wind Tunnel Environments</b>	IC2	\$24,981	\$24,575
<b>AFSOR SBIR Phase II- Highly Resolved Wall Shear Stress Measurement in High Speed Flows</b>	IC2	\$225,000	\$122,336
<b>NASA SBIR Phase II-Miniaturized Dynamic Pressure Sensor Arrays for Cross Flow Transition</b>	IC2	\$50,000	\$1,541
<b>Energy Dense and High Rate Electrochemical Capacitors: Advanced Nanomanufacturing</b>	Mainstream Engineering	\$107,477	\$0
<b>Colorectal Cancer Screening Project</b>	McJunkin Foundation	\$299,287	\$92,238
<b>A Responsive Closed-Loop Approach to Treat Freezing of Gait in Parkinson's Disease</b>	Michael J. Fox Foundation	\$111,818	\$18,699
<b>Prototype for Continuous Electrokinetic Dewatering of Phosphatic Clay Suspensions</b>	Mosaic Fertilizer, Inc	\$421,902	\$111,968
<b>FHTCC: Mask-less Injection Microstereolithography for 3D</b>	Nanoptics Inc	\$84,000	\$29,639
<b>Total</b>		<b>\$2,950,116</b>	<b>\$782,014</b>

### Foreign Sponsorship

Title of Grant	Funding Agency	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
Heterogeneous System IC Integration Process Technology using IPD Si-Substrate	Korea Electronics Technology Institute	\$418,120	\$38,284
Compact Array Antennas with High-Gain and High Electromagnetic Proof Characteristics	ETRI	\$120,000	\$22,901
A New Generation of Endoscope with Integrated & Distributed	Université of Franche-Comté	\$33,000	\$3,591
	<b>Total</b>	<b>\$571,120</b>	<b>\$64,776</b>

### Internal Sponsorship

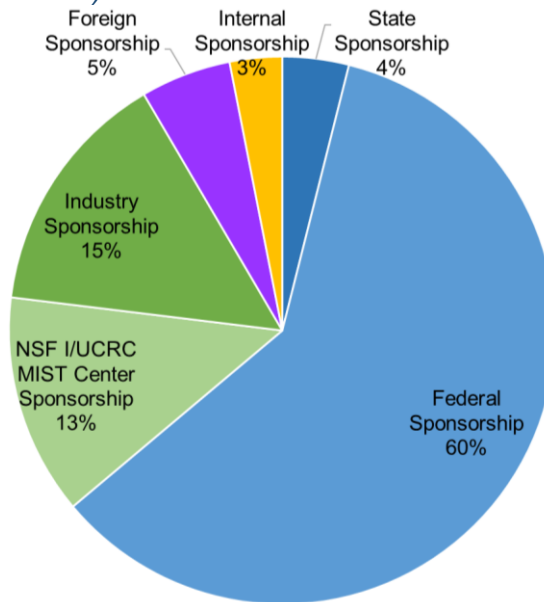
Title of Grant	Funding Sponsor	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
IPPD Subproject: MEMS IMU Stabilization via Direct Thermal Control	Miscellaneous Donors Industry Funds	\$16,500	\$15,321
IPPD Subproject: Hydration Monitoring System	Miscellaneous Donors Industry Funds	\$16,500	\$0
DSR Match NSF Fellow: Freidkes	UF Division of Sponsored Research Matching Funds	\$2,000	\$121
A MEMS-based Fiber-Optic Two-Photon Microscopy Probe For in vivo 3D Imaging of Neural Activity in Unrestrained, Behaving Animals	UF Division of Sponsored Research Opportunity Fund	\$25,244	\$2,971
Electron Paramagnetic Resonance Microresonators for Mammalian Cells	UF Division of Sponsored Research Opportunity Fund	\$30,373	\$178
Electrodynamic Wireless Power Transmission Prototype	UF OTL	\$25,526	\$14,262
Nano-Electro-Mechanical Acoustic Labels for Product Identification and Authentication	UF OTL	\$ 28,880	\$22,037
Establishing an Interdisciplinary Team and Competitive Platform for a Quantum Grant	UF	\$185,414	\$44,923
	<b>Total</b>	<b>\$330,437</b>	<b>\$99,813</b>

## Finance Summary

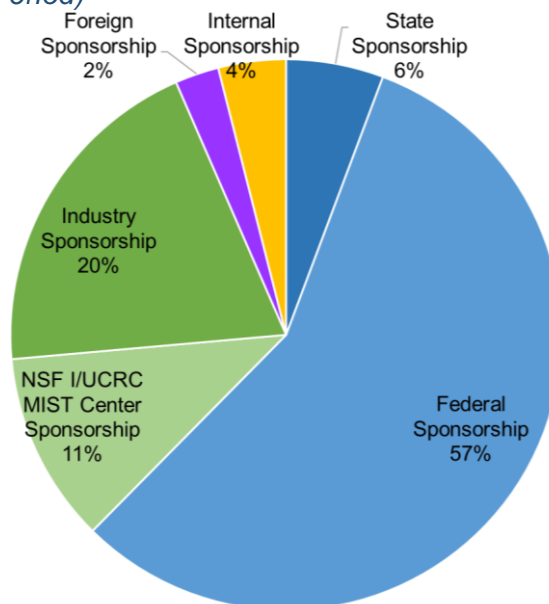
### Total Funding

	Faculty's Portion (Funding Period)	Expenditures (Reporting Period)
Total	\$10,666,577	\$2,517,289

### Faculty's Portion (Funding Period)



### Expenditures (Reporting Period)





## 2017 Courses offered by the IMG Faculty

### Spring 2017

Instructor	Course Number	Course Name	Enrolled
Arnold, David	EMA 6936	Seminar For The Development Of Engineering Faculty	17
Arnold, David	EEL 3008	Physics of Electrical Engineering	96
Judy, Jack	EEE 4260C	Bioelectrical Systems	20
Moghaddam, Saeed	EML 6155	Convection Heat Transfer	39
Sheplak, Mark	EEE 4720 EEE 5725	Acoustics	14 2
Tabrizian, Roozbeh	EEL 4930 EEL 5934	Resonant MEMS	7 9
Xie, Huikai	EEL 4930 EEL 5934	Introduction to Biophotonics	10 5
Xie, Huikai	EEE 5354L	Semiconductor Device Fabrication	30
Yoon, Y.K.	EEE 3308C	Electronic Circuits 1	60

### Fall 2017

Instructor	Course Number	Course Name	Enrolled
Arnold, David	EEL 3008	Physics of Electrical Engineering	82
Arnold, David	EEL 4412 EEL 5417	Applied Magnetism and Magnetic Materials	8 13
Fan, Hugh	EGN 3353C	Fluid Mechanics	159
Judy, Jack	EEL 5225	Principles of MEMS Transducers	16
Sheplak, Mark	EML 4220	Vibrations	36
Tabrizian, Roozbeh	EEL 3112	Circuits 2	78
Xie, Huikai	EEE 5354L	Semiconductor Device Fabrication	30



### Microsystem Technology Certificate

In 2016, IMG has developed a new graduate certificate program in "Microsystem Technology."

Certificate Description: The Microsystem Technology certificate prepares students for the complex, interdisciplinary development of microsystem technologies such as microactuators, microsenors, microfluidic devices, micropower systems, microoptical devices, and other microelectromechanical systems (MEMS).

Requirements for Admission: A bachelor's degree or equivalent from a regionally accredited institution. Students must be registered in a graduate degree program in the College of Engineering and maintain a 3.0 GPA.

Requirements for Completion: Students must complete the following courses (9 credits total) with a grade of B or higher:

1. Required:

EEE 5405 Microelectronic Fabrication Technologies

2. Any two of the following:

EEE 5354L Semiconductor Device Fabrication Laboratory

EEL 5225 Principles of Micro-Electro-Mechanical Transducers

EEE 6465 Design of MEMS Transducers

EEE 6460 Advanced Microsystem Technology

BME 5580 Microfluidics and BioMEMS

Awarded Certificates in 2017:

Semester	Certificates Awarded
Fall 2016	1
Spring 2017	4
Fall 2017	1
Total	6

## Personnel Accomplishments

### Faculty Accomplishment

- Prof. David Arnold:
  - UF ECE Excellence Award for Service 2017
  - George Kirkland Engineering Leadership Professorship 2016-present
  - UF Research Foundation Professorship 2016-2019
  - Graduate Recruiting and Admissions Committee, Chair 2015-present
  - Eta Kappa Nu, ECE Honor Society, Faculty advisor 2005-present
- Prof. Z. Hugh Fan
  - UF Research Foundation Professorship 2014-2017
  - George N Sandor Faculty Fellow 2015-2018
  - American Association for the Advancement of Science (AAAS) Fellow 2016-present
- Prof. Jack Judy
  - NIMET Director 2013-present
- Prof. Saeed Moghaddam
  - Doctoral Dissertation Advisor/Mentor Award, HWCOE 2017
- Prof. Toshikazu Nishida
  - Associate Dean of Academic Affairs 2017-present
  - UF Term professorship 2017-2020
  - Alan Hastings Faculty Fellow Award 2017
- Prof. Roozbeh Tabrizian
  - 2018 National Science Foundation (NSF) CAREER Award 2018-2023
  - Golden Reviewer, IEEE Transactions on Electron Devices 2012-present
- Prof. Huikai Xie
  - 2018 SPIE Fellow 2018-Present
  - 2018 IEEE Fellow 2017-present
- Prof. Yong-Kyu Yoon
  - UF Term professorship 2017-2020
  - Doctoral Dissertation Advisor/Mentor Award, HWCOE 2017

### International Conference Leadership

- Prof. David Arnold
  - Local Arrangements Chair, Transducers 2021 2021
  - General Co-Chair, 2018 PowerMEMS Conference 2018
- Prof. Hugh Fan
  - Sponsorship Committee Chair,  $\mu$ TAS 2017 2017
- Prof. Alexandra Garraud
  - PowerMEMS School Chair, 2018 PowerMEMS Conference 2018
- Prof. Jack Judy
  - Co-Chairman: Gordon Research Conference on Neuroelectronic Interfaces 2022
  - General Chairman: Transducers 2021 2021
- Prof. Saeed Moghaddam
  - Co-Chair, 15<sup>th</sup> ICNMM 2017
  - Chair, 16<sup>th</sup> ICNMM 2018
- Prof. Y.K. Yoon

- Chair, MiSA 25<sup>th</sup> Anniversary Meeting, Global Education Center for Engineers 2017

### International Conference Technical Program Committees

- Prof. David Arnold
  - IEEE Intermag 2017
  - PowerMEMS 2017
  - Executive TPC, Transducers 2017
- Prof. Hugh Fan
  - Executive TPC,  $\mu$ TAS 2018-2020
- Prof. Y.K. Yoon
  - Hilton Head Workshop 2018
  - IEEE ECTC (High Speed, Wireless & Components Division) 2017
  - Transducers 2017 2017

### Students Awards

- Mayur Ghatge, Seahee Hwangbo, Camilo Vélez, **IMG Excellence in Research Award.**
- Camilo Vélez, Xiao Wen, **IMG Excellence in Service Award.**
- Camilo Velez, **UF Herbert Wertheim College of Engineering Attribute of a Gator Engineer Award** in the area of creativity
- Sheng-Po Fang, **UF Herbert Wertheim College of Engineering Attribute of a Gator Engineer Award** in the area of service to the global community.
- Todd Schumann, **UF Graduate Student Teaching Award in 2016 – 2017.**
- Jose Varillas, **UF Health Cancer Center Research Day Predoctoral Poster Award** – "Isolation, Detection, and Analysis of Circulating Tumor Cells in Microfluidic Devices for Monitoring Pancreatic Cancer Treatment Response," under the supervision of Dr. Hugh Fan.
- Daniel Alabi, Nicolas Garraud, John Varela, **Best Poster** and **Best Demo Awards at the MIST 2017 Fall Meeting** – "Chip-Scale MEMS Receivers for Low-Power Wireless Charging," under the supervision of Dr. Alexandra Garraud and Dr. David Arnold.
- Todd Schumann, Sheng-Po Fang, Yong-Kyu Yoon, **Global Youth Innovator Award at 2017 iCAN CES Summit** – "H3 Mouthguard"
- Seahee Hwangbo, **IEEE International Microwave Symposium (IMS) Student Paper Competition Award** (2<sup>nd</sup> place) – "Cu/Co Metaconductor based high signal integrity transmission lines for millimeter wave applications," under the supervision of Dr. Y.K. Yoon

### Graduation

Graduate student	Advisor	Title
Barnard, Casey	Sheplak, Mark	A sensor system for vector measurement of aerodynamic wall shear stress
Chugh, Devesh	Moghaddam, Saeed	Development and analysis of open absorption cycle based combined water heater and dehumidifier
Fang, Sheng-Po	Yoon, Y.K.	Functionalized electrospun nanofibers and their biomedical applications

<b>Jones, Ashley</b>	Cattafesta, Lou	Unsteady circulation control for high-performance low-noise aircraft
<b>June, Jason</b>	Sheplak, Mark	An acoustic and hydrodynamic study of grazing flow over Helmholtz resonators
<b>Reagan, Tiffany</b>	Sheplak, Mark	MEMS on a plane: A flush-mount MEMS piezoelectric microphone for aircraft fuselage arrays
<b>Rogers, John</b>	Sheplak, Mark	A passive wireless MEMS dynamic pressure sensor for harsh environments
<b>Velez-Cuervo, Camilo</b>	Arnold, David	Engineering microscale magnetic devices for next-generation microrobotics
<b>Wen, Xiao</b>	Arnold, David	On the exploration of electro-infiltrated magnetic nanocomposites

### Proposal Defense

Graduate student	Advisor	Title
<b>Chen, Kangfu</b>	Fan, Hugh	Flow and interaction patterns between tumor cells and microfabricated structures
<b>Chojekki, Paul</b>	Nishida, Toshi	Ferroelectric capacitors: stress simulations and SPICE end-of-life modeling with performance and reliability emphasis
<b>Clingenpeel, Timothy</b>	Yoon, Y.K.	Nano-layered non-magnetic/ferromagnetic metaconductors for energy efficient RF passives
<b>Ghatge, Mayur</b>	Tabrizian, Roozbeh	Linear and non-linear micro-acoustic waveguides for frequency control applications
<b>Hwangbo, Seahee</b>	Yoon, Y.K.	Advanced millimeter wave antenna array module for modern wireless communications using 3D system-in-packaging technology
<b>Schumann, Todd</b>	Yoon, Y.K.	RF and optical applications of perovskite ferroelectric materials
<b>Zhou, Haocheng</b>	Sheplak, Mark	A MEMS-based five-hole probe with optical pressure transducers

### New Alumni

Alumnus	Degree	Advisor	Company
<b>Barnard, Casey</b>	Doctorate	Sheplak, Mark	<a href="#">Sandia National Lab</a>

<b>Chugh, Devesh</b>	Doctorate	Moghaddam, Saeed	<a href="#">Intel Corporation</a>
<b>Fang, Sheng-Po</b>	Doctorate	Yoon, Y.K.	<a href="#">Intel Corporation</a>
<b>Hwang, Hyun-Sik</b>	Doctorate	Sodano, Henry	<a href="#">University of Michigan</a>
<b>Jo, Bumkyung</b>	Master of Science	Tabrizian, Roozbeh	<a href="#">University of Florida</a>
<b>Jones, Ashley</b>	Doctorate	Cattafesta, Lou	<a href="#">Boeing</a>
<b>June, Jason</b>	Doctorate	Sheplak, Mark	<a href="#">NASA Langley Research Center</a>
<b>Kallam, Karunakar</b>	Master of Science	Tabrizian, Roozbeh	<a href="#">Apple</a>
<b>Karri, Pratyusha</b>	Master of Science	Tabrizian, Roozbeh	<a href="#">Apple</a>
<b>Liu, Tao</b>	Post-Doctorate	Xie, Huikai	<a href="#">Chengdu University of Information and Technology</a>
<b>Natt, Sruthi</b>	Master of Science	Judy, Jack	<a href="#">Nanopec Inc</a>
<b>Reagan, Tiffany</b>	Doctorate	Sheplak, Mark	<a href="#">Sandia National Lab</a>
<b>Sun, Mendgi</b>	Master of Engineering	Xie, Huikai	<a href="#">University of Central Florida</a>
<b>Velez, Camilo</b>	Doctorate	Arnold, David	<a href="#">University of Florida</a>
<b>Wang, Chun-Wei</b>	Post-Doctorate	Fan, Hugh	<a href="#">OneVax, LLC</a>
<b>Wang, Wei</b>	Doctorate	Xie, Huikai	<a href="#">Huawei Company</a>
<b>Wen, Xiao</b>	Doctorate	Arnold, David	<a href="#">Intel Corporation</a>
<b>Yang, Bruce</b>	Master of Engineering	Xie, Huikai	<a href="#">Columbia University</a>
<b>Zhao, Yunpeng</b>	Master of Engineering	Xie, Huikai	<a href="#">University of Florida</a>



## IMG Seminars Series

Supported by the IMG Alumni fund

Date	First speaker	Second speaker
<b>January, 13</b>	Mayur Ghatge (Dr Roozbeh Tabrizian) – <i>Power Insensitive Silicon Crystal cut for Amplitude Stable Frequency Synthesis</i>	Paul Chojeci (Dr Toshi Nishida) – <i>Improvement of Ferroelectric RAM performance through stress engineering</i>
<b>January, 27</b>	Jose Varillas (Dr Hugh Fan) – <i>Enumeration, Characterization, and Clinical Usage of Circulating Tumor Cells</i>	Amy Haberman (Director of Laboratory Safety, UF HWCOE) [Invited] – <i>Safety as a professional engineering skill</i>
<b>February, 2</b>	Dr. YK Yoon – <i>CES 2017 Outlook: Advanced Technology and Innovation</i>	Neelam Bharti (UF Library) [Invited] – <i>Library 3D printing and other resources on campus</i>
<b>March, 10</b>	Liang Zhou (Dr Huikai Xie) – <i>A Bi-directional Large-stroke Electrothermal MEMS Mirror with Minimal Thermal and Temporal Drift</i>	Dr. Renato Figueiredo (UF) [Invited] – <i>Overlay Virtual Private Networks for Seamless, Secure Communications from Sensors to Clouds</i>
<b>April, 21</b>	Dr. Swarup Bhunia (UF) [Invited] – <i>Overview on the FICS institute and their research</i>	Dr. Steve Horowitz (IC2 President, owned and co-founded by Dr. Sheplak) [Invited] – <i>Overview of the IC2 company</i>
<b>September, 22</b>	Dr. Kevin Jones (UF) [Invited] – <i>Semiconductor materials research</i>	Dr. Sanjeev Koppal (UF) [Invited] – <i>Computational photography and computer vision</i>
<b>October, 20</b>	Erik Sander (UF) [Invited] – <i>UF Engineering Innovation Institute</i>	Dr. Mark Law (UF) [Invited] – <i>Semiconductor research</i>
<b>November, 3</b>	Dr Igor Bargatin (UPenn) [Invited] – <i>Plate Mechanical Metamaterials- The Thinnest Plates you can Pick Up by Hand</i>	
<b>November, 17</b>	Chang Peng (Dr Saeed Moghadam) – <i>Physical mechanisms of direct-contact ultrasonic cloth drying process</i>	Glen Walters (Dr. Toshi Nishida) – <i>Reliability and Retention of Ferroelectric Memories</i>
<b>December, 1</b>	Dr Roozbeh Tabrizian – <i>Linear or Nonlinear Nano-Acoustic Signal Processors for 5G Wireless Communication - One problem, two approaches</i>	Mehrdad Ramezani (Dr Roozbeh Tabrizian) – <i>High-Q Silicon Fin Bulk Acoustic Resonators for Signal Processing Beyond the UHF</i>

## Publications

### Editorial Advisory Boards

- David Arnold: Editorial Board, *J. Micromechanics and Microengineering* 2013-present
- David Arnold: Associate Editor, *Energy Harvesting and Systems* 2013-present
- Z. Hugh Fan: Editorial Board, *Scientific Reports* 2013-present
- Z. Hugh Fan: Editor, *Microsystems and Nanoengineering* 2017-present
- Toshi Nishida: Editorial Board, MDPI Sensors 2015-present
- Mark Sheplak: Associate Editor, *Journal of Acoustical Society of America* 2011-present
- Mark Sheplak: Associate Editor: *JASA Express Letters* 2011-present
- Huikai Xie, Editor, *Active and Passive Electronic Components* 2017-present
- Huikai Xie, Editor, *IEEE Sensors Letters* 2016-present
- Huikai Xie, Editor, *Micromachines* 2017-present
- Huikai Xie, Associate Editor, *the International Journal of Optomechatronics* 2011-present
- Y.K. Yoon, Editor, *Micro and Nano Systems Letters* 2017-present

### Reviewers for Scholarly Journals

- ACS Sensors
- Advanced Materials Technology
- AIAA Journal
- Analytical Chemistry
- Angewandte Chemie
- Applied Energy
- Applied Physics Letter
- Applied Thermal Engineering
- Biomedical Optics Express
- Biomicrofluidics
- Drying Technology
- Energy
- Experimental Thermal Fluid Science
- IEEE Electron Device Letters
- IEEE Photonic Technology Letters
- IEEE Sensors Journal
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Components, Packaging and Manufacturing Technology
- IEEE Transactions on Electron Devices
- IEEE Transactions on Magnetism
- International Journal of Heat and Mass Transfer
- International Journal of Hydrogen Energy
- International Journal of Thermal Sciences
- Journal of Alloys and Compounds
- Journal of Biomedical Optics
- Journal of Energy Resources Technologies
- Journal of Microelectromechanical Systems
- Journal of Micromechanics and Microengineering
- Journal of the Acoustical Society of America
- Lab on a Chip
- Langmuir
- Microfluidics and Nanofluidics
- Nature Microsystems and Nanoengineering
- Nature Scientific Reports
- Optics Express
- Optics Letters
- PLOS ONE
- RSC Advances
- Science and Technology for the Built Environment
- Scientific Reports
- Sensors and Actuators A

### International peer-reviewed journals (43)

- S. Bigham, A. Fazeli, S. Moghaddam, "[Physics of Microstructures Enhancement of Thin Film Evaporation Heat Transfer in Microchannels Flow Boiling](#)," *Scientific Reports*, vol. 7, pp. 44745, 2017
- S. Bigham, S. Moghaddam, "[Physics of the Microchannel Flow Boiling Process and Comparison with the Existing Theories](#)," *Journal of Heat Transfer*, vol. 139, issue 11, pp. 111503, 2017
- T. S. Bonny, M. Pan, J. C. Loeb, X. Jiang, A. Eiguren-Fernandez, S. Hering, Z. H. Fan, C-Y Wu, J. A. Lednicky, "[Drifted Influenza A and B Viruses Collected by a Water-Based Condensation Growth Air Sampler in a Student Health Care Center during an Influenza Outbreak](#)," *Genome Announcements (American Society for Microbiology)*, vol. 5, issue 15, pp. e00178-17, 2017
- C. L. Cassano, T. Georgiev, Z. H. Fan, "[Using Airbrushes to Pattern Reagents for Microarrays and Paper-fluidic Devices](#)," *Microsystems & Nanoengineering*, vol. 3, pp. 17055; 2017
- K. Chen, T. Georgiev, W. Sheng, X. Zheng, J. I. Varillas, J. Zhang, Z. H. Fan, "[Tumor Cell Capture Patterns around Aptamer-Immobilized Microposts in Microfluidic Devices](#)," *Biomicrofluidics*, vol. 11, issue 5, pp. 054110; 2017
- J. Cheng, W. Liu, Q. Chen, N. Xu, Q. Sun, Y. Liu, W. Wang, H. Xie, "[A MEMS variable optical attenuator based on a vertical comb drive with self-elevated stators](#)," *Sensors and Actuators A: Physical*, vol. 271, pp. 398-408, 2018
- D. Chugh, K. Gluesenkamp, O. Abdelaziz, S. Moghaddam, "[Ionic liquid-based hybrid absorption cycle for water heating, dehumidification, and cooling](#)," *Applied Energy*, vol. 202, pp. 746-754, 2017
- L. Cremaschi, S. Moghaddam, "[Editorial: Recent Advances on Heat and Mass Transfer in Refrigeration and Air Conditioning Systems](#)," *Science and Technology for the Built Environment*, vol. 23, issue 6, pp 871-874, 2017
- X. Dai, H. Yang, T. Shan, H. Xie, S. A Berceci, H. Jiang, "[Miniature endoscope for multimodal imaging](#)," *ACS Photonics*, vol. 4, issue 1, pp. 174-180, 2017
- J. Ewing, Y. Wang, D. P. Arnold, "[High-current-density electrodeposition using pulsed and constant currents to produce thick CoPt magnetic films on silicon substrates](#)," *AIP Advances*, vol. 8, pp. 056711, 2018
- S.-P. Fang, P. Jao, D. E. Senior, K.-T. Kim, Y.-K. Yoon, "[Study on high throughput nanomanufacturing of photopatternable nanofibers using tube nozzle electrospinning with multi-tubes and multi-nozzles](#)," *Micro and Nano Systems Letters*, vol. 5, issue 10, 2017
- A. Fazeli, S. Moghaddam, "[A New Paradigm for Understanding and Enhancing the Critical Heat Flux \(CHF\) Limit](#)," *Scientific Reports*, vol. 7, issue 1, pp. 5184, 2017
- J. L. Garcia-Cordero, Z. H. Fan, "[Sessile droplets for chemical and biological assays](#)," *Lab on a Chip*, vol. 17, issue 13, pp. 2150-2166, 2017
- N. Garraud, R. Dhavalikar, L. Maldonado-Camargo, D. P. Arnold, C. Rinaldi, "[Design and validation of magnetic particle spectrometer for characterization of magnetic nanoparticle relaxation dynamics](#)," *AIP Advances*, vol. 7, issue 5, pp. 056730, 2017
- K. Gluesenkamp, D. Chugh, O. Abdelaziz, S. Moghaddam, "[Efficiency Analysis of Semi-Open Sorption Heat Pump Systems](#)," *Renewable Energy*, vol. 110, pp. 95-104, 2017
- B. A. Griffin, M. D. Williams, B. V. Sankar, G. Wang, L. N. Cattafesta, M. Sheplak, "[The electromechanical behavior of piezoelectric thin film composite diaphragms possessing in-plane stresses](#)," *Journal of Micromechanics and Microengineering*, vol. 27, issue 4, pp. 045017, 2017

- H. Guo, C. Song, H. Xie, L. Xi, "[Photoacoustic endomicroscopy based on a MEMS scanning mirror](#)," *Optics Letters*, vol. 42, issue 22, pp. 4615-4618, 2017
- S. Hwangbo, H.-Y. Yang, Y.-K. Yoon, "[Mutual Coupling Reduction using Micromachined Complementary Meander Line Slots for a Patch Array Antenna](#)," *IEEE Antennas and Wireless Propagation Letters*, vol. 16, issue 1, 2017
- T Jin, H Guo, L Yao, H Xie, H Jiang, L Xi, "[Portable Optical Resolution Photoacoustic Microscopy for Volumetric Imaging of Multiscale Organisms](#)," *Journal of Biophotonics*, vol.11, issue 4, e201700250, 2018
- J. Li, V. Tseng, Z. Xiao, H. Xie, "[A High-Q In-Silicon Power Inductor Designed for Wafer-Level Integration of Compact DC-DC Converters](#)," *IEEE Transactions on Power Electronics*, vol. 32, issue 5, pp. 3858-3867, 2017
- J. Li, W. Haas, K. Jackson, E. Kuru, M. C. Jewett, Z. H. Fan, S. Gygi, G. M. Church, "[Co-generating synthetic parts toward a self-replicating system](#)," *ACS Synthetic Biology*, vol. 6, issue 7, pp. 1327-1336, 2017
- M. Li, Q. Chen, Y. Liu, Y. Ding, H. Xie, "[Modeling and Experimental Verification of Step Response Overshoot Removal in Electrothermally-Actuated MEMS Mirrors](#)," *Micromachines*, vol. 8, issue 10, pp. 289, 2017
- Y Li, H Liu, H Huang, Y Zhu, H Deng, J Yu, S Luo, L Huo, L Lin, H Xie, G Li, "Progress of the application of optical coherence tomography in gastrointestinal tumor surgery," *Chinese Journal of Gastrointestinal Surgery*, vol. 20, issue 6, pp. 716-720, 2017
- X. Li, H. Zhao, L. Shi, X. Zhu, M. Lan, Q. Zhang, Z. H. Fan, "[Electrochemical sensing of nicotine using screen-printed carbon electrodes modified with nitrogen-doped graphene sheets](#)", *Journal of Electroanalytical Chemistry*, vol. 784, pp. 77-84, 2017
- W. Liao, E. X. Zhang, M. L. Alles, C. X. Zhang, H. Gong, K. Ni, A. L. Sternberg, H. Xie, D. M. Fleetwood, R. A. Reed, R. D. Schrimpf, "[Total-Ionizing-Dose Effects on Piezoelectric Micromachined Ultrasonic Transducers](#)," *IEEE Transactions on Nuclear Science*, vol. 64, issue 1, pp. 233-238, 2017
- P. D. Lomenzo, C.-C. Chung, C. Zhou, J. L. Jones, T. Nishida, "[Doped Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> for high efficiency integrated supercapacitors](#)," *Applied Physics Letters*, vol. 110, issue 23, pp. 232904, 2017
- S. Luo, Q. Guo, H. Zhao, X. An, L. Zhou, H. Xie, J. Tang, X. Wang, H. Chen, L. Huo, "[Noise Reduction of Swept Source Optical Coherence Tomography via Compressed Sensing](#)," *Photonics Journal*, vol. 10, issue 1, pp. 3800109, 2018
- M. Mortazavi, A. Fazeli, S. Moghaddam, "[Scalable Bonding of Nanofibrous Polytetrafluoroethylene \(PTFE\) Membranes on Microstructures](#)," *Journal of Micromechanics and Microengineering*, vol. 28, issue 1, pp. 015001, 2018
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- M. Pan, T. S. Bonny, J. Loeb, X. Jiang, J. A. Lednický, A. Eiguren-Fernandez, S. Hering, Z. H. Fan, C.Y. Wu, "[Collection of Viable Aerosolized Influenza Virus and Other Respiratory Viruses in a Student Health Care Center through Water-Based Condensation Growth](#)," *mSphere*, vol. 2, issue 5, pp. e00251-17, 2017
- C. Peng, A. Momen, S. Moghaddam, "[An Energy-Efficient Method for Direct-Contact Ultrasonic Cloth Drying](#)," *Energy*, vol. 138, pp. 133-138, 2017
- C. Peng, S. Ravi, V. Patel, A. Momen, S. Moghaddam, "[Physics of Direct-Contact Ultrasonic Cloth Drying Process](#)," *Energy*, vol. 125, pp. 498-508, 2017
- B. Qi, J. S. Andrew, D. P. Arnold, "[Calcium-assisted reduction of cobalt ferrite nanoparticles for nanostructured iron cobalt with enhanced magnetic performance](#)," *Journal of Nanoparticle Research*, vol. 19, issue 89, 2017



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- S. G. Sawant, B. George, L. S. Ukeiley, D. P. Arnold, "[Microfabricated electrodynamic synthetic jet actuators](#)," *Journal of Microelectromechanical Systems*, vol. 27, issue 1, pp. 95-105, 2018
- M. Sheplak, "[MEMS-Based acoustic sensors for fluid mechanics and aeroacoustics](#)," *The Journal of the Acoustical Society of America*, vol. 141, issue 5, pp. 3721-3721, 2017
- Q. Tanguy, S. Bargiel, H. Xie, N. Passilly, M. Barthès, O. Gaiffe, J. Rutkowski, P. Lutz, C. Gorecki, "[Design and Fabrication of a 2-Axis Electrothermal MEMS Micro-Scanner for Optical Coherence Tomography](#)," *Micromachines*, vol. 8, issue 5, pp.146 , 2017
- M. Unni, A. Uhl, S. Savliwala, B. Savitzky, R. Dhavalikar, N., D. P. Arnold, L. Kourkoutis, J. S. Andrew, C. Rinaldi, "[Thermal decomposition synthesis of iron oxide nanoparticles with diminished magnetic dead layer by controlled addition of oxygen](#)," *ACS Nano*, vol. 11, issue. 2, pp. 2284-2303, 2017
- C. Velez, R. E. Carroll, D. P. Arnold, "[Direct measurement and microscale mapping of nanoNewton to milliNewton magnetic forces](#)," *AIP Advances*, vol. 7, issue.5, pp. 056809, 2017
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- H. Yu, N. Afshar-Mohajer, A. Theodore, J. Lednicky, Z. H. Fan, C.Y. Wu, "[An Efficient Virus Aerosol Sampler Enabled by Adiabatic Expansion](#)," *Journal of Aerosol Science*, vol. 117, pp. 74-84, 2018
- Z. Zhao, I. Torres-Díaz, C. Vélez, D. Arnold, C. Rinaldi, "[Brownian Dynamics Simulations of Magnetic Nanoparticles Captured in Strong Magnetic Field Gradients](#)," *Journal of Physical Chemistry C*, vol. 121, issue 1, pp. 801-810, 2017
- L. Zhou, Z. Chen, J. Cheng, Q. Chen, Y. Ding, H. Xie, "[Investigation of dynamic thermal behaviors of an electrothermal micro-mirror](#)," *Sensors and Actuators A*, vol. 263, pp. 269-275, 2017

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- M. Bauer, X. Wen, P. Tiwari, D. P. Arnold, J. S. Andrew, "Assembly of magnetoelectric nanowires into magnetic field sensors," *Proc. 2017 Electronic Materials and Applications Conf.*, Orlando, FL, 2017
- S. Bigham, S. Moghaddam, "Fundamentals of Microchannel Flow Boiling Sub-processes and Similarities and Differences with Pool Boiling," *Proc. 15<sup>th</sup> ICNMM*, Cambridge, MA, 2017
- S. Bigham, S. Moghaddam, "Microscale Analysis of Mechanisms of Heat Transfer in Microchannel Flow Boiling Process," *Proc. 15<sup>th</sup> ICNMM*, Cambridge, MA, 2017
- R. E. Carroll, J. A. Little, B. P. Mann, D. P. Arnold, "[Demonstration of tunable energy propagation using magneto-mechanical oscillator arrays](#)," *Proc. 30<sup>th</sup> IEEE MEMS*, Las Vegas, NV, 2017
- K. Chen, T. Georgiev, Z. H. Fan, "[Interactions between Circulating Tumor Cells and Aptamer-Functionalized Microposts in a Flow](#)," *Proc. ASME IMECE 2017*, Tampa, FL, 2017

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- D. Chugh, K. Gluesenkamp, O. Abdelaziz, S. Moghaddam, "Hybrid Membrane-based Ionic Liquid Absorption Cycle for Water Heating, Dehumidification, and Cooling," *Proc. 12<sup>th</sup> IEA Heat Pump Conference*, Rotterdam, Netherlands, 2017
- T. Clingenpeel, A. Rahimi, Y.-K. Yoon, "[Reliability of Cu/NiFe and Cu/Ni metaconductor devices for RF applications](#)," *Proc. IEEE 67<sup>th</sup> ECTC*, Orlando, FL, 2017
- V. H. Desai, B. S. Spearman, C. S. Shafor, S. Natt, B. Teem, J. B. Graham, E. W. Atkinson, R. A. Wachs, E. A. Nunamaker, K. J. Otto, C. E. Schmidt, J. W. Judy, "[Design, fabrication, and characterization of a scalable tissue- engineered- electronic- nerve- interface \(TEENI\) device](#)," *Proc. 8<sup>th</sup> IEEE EMBS NER 2017*, Shanghai, China, 2017
- R. Dhavalikar, J. Chan, S. Savliwala, M. Unni, N. Garraud, D. P. Arnold, C. Rinaldi, "Monitoring magnetic nanoparticle synthesis progress using a benchtop magnetic particle relaxometer," *Proc. AIChE Annual Meeting*, Minneapolis, MN, 2017
- P. Dopico, C. Wang, C. Rinaldi, T. J. George, M. Segal, Z. H. Fan, "Dialysis-Like Tumor Cell Removal Using Capillary Bundles," *Proc. 21<sup>st</sup>  $\mu$ TAS 2017*, Savannah, GA, 2017
- S.-P. Fang, L. Colon-Perez, J. Zhou, T. B. Demarse, M. Febo, P. R. Carney, Y.-K. Yoon, "[High Magnetic Field fMRI Compliant Carbon Nanofiber Neural Probes](#)," *Proc. Transducers 2017*, Kaohsiung, Taiwan, 2017
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