

ANDREWS, JOSEPH B

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EDUCATION

Duke University Doctor of Philosophy Department of Electrical and Computer Engineering	2019
University of South Carolina Honors College Bachelor of Science in Engineering Department of Electrical Engineering	2015

FELLOWSHIPS AND AWARDS

Duke's ECE Department Outstanding Ph.D. Dissertation Award	2020
NIH F31 Ruth L. Kirschstein Fellowship Award	2018
MIT-Lemelson Student Prize Finalist	2018
2 nd Place iMatSci Student Pitch Award – Fall MRS Meeting, Boston	2017
1 st Place Student Paper – IEEE Sensors Conference, Scotland	2017
1 st Place Research Poster – Duke ECE Graduate Student Workshop	2017
Kristina M. Johnson Fellowship	2017
NSF GRFP Honorable Mention	2017
James B. Duke Fellowship – Graduate fellowship from Duke Univ.	2015-2019
Who's Who among American Colleges and Universities	2015
Univ. of South Carolina Outstanding Senior Award	2015
1 st Place Research Poster, Discovery Day – Univ. of South Carolina	2015
Phi Beta Kappa Honors Fraternity	2014
Magellan Research Scholarship – Univ. of South Carolina	2014
DAAD-Rise Scholarship Award – German Research Scholarship	2014
Electrical Engineering Departmental Scholarship – Univ. of South Carolina	2011 – 2015
Coopers Scholar –University scholarship for academic merit	2011 – 2015

ACADEMIC AND PROFESSIONAL APPOINTMENTS

Assistant Professor <i>University of Wisconsin-Madison, Departments of Mechanical Engineering and Electrical and Computer Engineering</i>	2019 – Present
Research Intern <i>Microsoft Applied Sciences Group</i>	2018
Graduate Research Assistant <i>Duke University, Advisor: Dr. Aaron Franklin</i>	2015 – 2019
Undergraduate Research Assistant <i>University of South Carolina, Advisor: Dr. MVS Chandrashekar</i>	2012 – 2015

PUBLICATIONS

Refereed Journals

1. Schnittker, K., Tursunniyaz, M., **Andrews, J.B.** “Recent advances in printable carbon nanotube transistors for large-area active matrices.”, *Journal of Information Display*, pp. 1-17, 2021.

2. Cardenas, J.A., **Andrews, J.B.**, Noyce, S.G., Franklin, A.D. "Carbon nanotube electronics for IoT sensors." *Nano Futures*, vol. 4, no. 1, p. 012001, 2020.
3. Lu, S., Cardenas, J.A, Worsley, R., Williams, N.X., **Andrews, J.B.**, Casiraghi, C., Franklin, A.D. "Flexible, Print-in-Place 1D-2D Thin-Film Transistors using Aerosol Jet Printing." *ACS Nano*, vol. 13, no. 10, pp. 11263-11272, 2019.
4. Lin, Y.C., McGuire, F., Noyce, S.G., Williams, N., Cheng, Z., **Andrews, J.B.**, Franklin, A.D. "Effects of Gate Stack Composition and Thickness in 2-D Negative Capacitance FETs." *IEEE Journal of the Electron Devices Society*, vol. 7, pp. 645-649, 2019.
5. **Andrews, J.B.**, Ballentine, P., Cardenas, J.A., Lim, C.J., Williams, N.X., Summers, J., Stangler, M., Koester, D., Cummer, S.A. and Franklin, A.D. "Printed Electronic Sensor Array for Mapping Tire Tread Thickness Profiles." *IEEE Sensors Journal*, vol. 19, no. 19, pp. 8913-8919, 2019
6. **Andrews, J. B.**, Cardenas, J. A., Lim, C. J., Noyce, S. G., Mullett, J., & Franklin, A. D. "Fully Printed and Flexible Carbon Nanotube Transistors for Pressure Sensing in Automobile Tires." *IEEE Sensors Journal*, vol. 18, pp. 7875-7880, 2018.
7. **Andrews, J. B.**, Mondal K. Neumann, T., Cardenas, J. A., Wang, J., Parekh, D., Lin, Y., Ballentine, P., Dickey, M., & Franklin, A. D. "Patterned liquid metal contacts for printed carbon nanotube transistors." *ACS Nano*, vol. 12, pp. 5482-5488, 2018.
8. Cardenas, J.A., Catenacci, M., **Andrews, J.B.**, Williams, N.X., Wiley, B.J., Franklin, A.D. "In-place printing of carbon nanotube transistors at low temperature." *ACS Applied Nano Materials*, vol. 1, no. 4, pp. 1863-1869, 2018.
9. Catenacci, M., Flowers, P., Cao, C., **Andrews, J.B.**, Franklin, A.D., Wiley, B.J. "Fully Printed Memristors from Cu-SiO₂ Core-Shell Nanowire Composites." *Journal of Electronic Materials*, vol. 46, no. 7, pp. 4612-4618.
10. **Andrews, J.B.**, Cao, C., Brooke, M., Franklin, A. "Noninvasive Material Thickness Detection by Aerosol Jet Printed Sensors Enhanced through Metallic Carbon Nanotube Ink." *IEEE Sensors Journal*, vol. 16, pp. 4612-4618, 2017
11. Cao, C., **Andrews, J.B.**, Franklin, A. D. "Completely Printed, Flexible, Stable, and Hysteresis-Free Carbon Nanotube Thin-Film Transistors via Aerosol Jet Printing." *Advanced Electronic Materials*, vol. 3, pp.1700057, 2017.
12. Catenacci, M. J., Flowers, P. F., Cao, C., **Andrews, J.B.**, Franklin, A. D., & Wiley, B. J. "Fully Printed Memristors from Cu-SiO₂ Core-Shell Nanowire Composites." *Journal of Electronic Materials*, vol. 46, pp. 4596-4603, 2017.
13. Joh, D Y., McGuire, F., Abedini-Nassab, R., **Andrews, J.B.**, Achar, R.K., Zimmers, Z., Mozhdehi, D., Blair, R., Albarghouthi, F., Oles, W., Richter, J., Fontes, C., Hucknall, A., Yellen, B., Franklin, A.D., Chilkoti, A. "Poly (oligo (ethylene glycol) methyl ether methacrylate) Brushes on High- κ Metal Oxide Dielectric Surfaces for Bioelectrical Environments." *ACS applied materials & interfaces*, vol. 9, pp. 5522-5529. 2017.
14. Arras, M. M., Jana, R., Mühlstädt, M., Maenz, S., **Andrews, J.B.**, Su, Z., Grasl, C., Jandt, K.D. "In Situ Formation of Nanohybrid Shish-Kebabs during Electrospinning for the Creation of Hierarchical Shish-Kebab Structures." *Macromolecules*, vol. 49, pp. 3550-3558, 2016.
15. Cao, C., **Andrews, J.B.**, Kumar, A., & Franklin, A.D. "Improving Contact Interfaces in Fully Printed Carbon Nanotube Thin-Film Transistors." *ACS nano*, vol. 10, pp. 5221-5229, 2016.
16. S.S. Shetu, S.U. Omar, K.M. Daniels, B. Daas, **Andrews, J.B.**, S. Ma, T.S. Sudarshan, MVS Chandrashekhar, "Si-atom kinetics in defect mediated growth of multilayer epitaxial graphene films on 6H-SiC", *J. Appl. Phys.*, vol. 114, pp. 164903. 2013.

Conference Proceedings

1. M. Tursunniyaz, **J. Andrews**, "Printed Capacitive Immunoassay for Detecting SARS-CoV-2 Viral Particles." IEEE International Conference on Flexible and Printable Sensors (FLEPS), 2021. (virtual)

2. K. Schnittker, **J. Andrews**, "Investigation of the Growth Mechanism for Hierarchical Polymer/Carbon Nanotube Nanohybrid Shish-Kebab Structures to Enable High-Performance Printable Thin-Film Transistors." Materials Research Society (MRS) Fall Meeting, 2020. (virtual)
3. S. Lu, J. A. Cardenas, R. Worsley, N. X. Williams, **J. Andrews**, C. Casiraghi, and A. D. Franklin, "Printing h-BN gate dielectric for flexible, low-hysteresis CNT thin-film transistors at low temperature," Device Research Conference (DRC) Technical Digest, (2019).
4. **J. Andrews**, K. Mondal, T. Neumann, M. Dickey, A. Franklin. "Eutectic Gallium-Indium Liquid Metal Contacts on Printed Carbon Nanotube Thin-Film Transistors", MRS Fall Meeting, Boston, MA, 2017.
5. **J. Andrews**, J. Cardenas, J. Mullett, A. Franklin " Fully Printed and Flexible Carbon Nanotube Transistors Designed for Environmental Pressure Sensing and Aimed at Smart Tire Applications", IEEE Sensors Conference, Glasgow, Scotland, 2017. **Awarded top student lecture.**
6. M. Catenacci, P. Flowers, C. Cao, **J. Andrews**, A. Franklin, B. Wiley. " Fully printed memristors from Cu-SiO₂ core-shell nanowire composites", Device Research Conference, South Bend, IN, 2017.
7. **J. Andrews**, K.P. Miller, K.M. Daniels, MVS Chandrashekhar, A.W. Decho. "Electrochemical Impedance Signatures of the Lifecycle of Bacterial Biofilm Formation on Epitaxial Graphene Grown on SiC", MRS Electronic Materials Conference, Columbus, OH, 2015.
8. K. M. Daniels, N. Aich, K. P. Miller, **J. Andrews**, S. Sudarshan, MVS Chandrashekhar, "Real-Time Sensing of E. Coli Biofilm Growth Using Epitaxial Graphene", IEEE Sensors, Baltimore, MD, 2013.

Book Chapters

1. **J.B. Andrews**, J.A. Cardenas, A.D. Franklin, "Flexible and Stretchable Thin-Film Transistors," *Handbook on Flexible and Stretchable Electronics*, CRC Press, 2019.

Patents

1. **J.B. Andrews**, M.A. Brooke, A.D. Franklin, "Non-invasive thickness measurement using resonant frequency shift," U.S. Patent 9797703, ISSUED October 24, 2017.
2. **J.B. Andrews**, M.A. Brooke, A.D. Franklin, "Non-invasive thickness measurement using capacitance measurement," U.S.15133727 ISSUED November 12, 2018.
3. **J.B. Andrews**, M.A. Brooke, A.D. Franklin, "Non-invasive thickness measurement using capacitance measurement," PCT Patent: WO 2017/184185 A1, PUBLISHED October 26, 2017.
4. **J.B. Andrews**, M.A. Brooke, A.D. Franklin, "Non-invasive thickness measurement using resonant frequency shift," PCT Patent: WO 2017/155559 A1, PUBLISHED September 14, 2017

INVITED TALKS

1. The Institution of Electronics and Telecommunication Engineering (IETE) Mysore Section Meeting, India "Printable Electronic Sensors to Enable New Connected Platforms", virtual meeting, May 2021.
2. International Conference on Materials and System Engineering (ICMSE), **Keynote**, "Printable Electronic Sensors to Enable New Connected Platforms", virtual conference, May 2021.
3. IEEE International Conference on Flexible and Printable Sensors and Systems (IEEE FLEPs), **Tutorial**, "Printed Electronics from Nanomaterials: A Pathway to Ubiquitous Electronic Sensing", virtual conference, August 2020.

GRANTS AND SPONSORED RESEARCH PROJECTS

External:

Active:

1. PI: **Joseph Andrews**, Co-PI: Haneesh Kesari, “Tunable Capacitive Pressure Sensors Enabled By Printed Microstructures and Designed using Continuum Mechanics Modeling,” *Office of Naval Research (ONR)*
\$775,000 [Andrews’ portion: \$361,911], September 2021 – August 2024.
2. PI: Christian Franck, Co-PIs: **Joseph Andrews**, Haneesh Kesari, David Hennan, Ron Szalkowski, Ashfaq Adnan, “Multiscale, physics-based approach for traumatic brain injury prediction and prevention,” *Office of Naval Research (ONR)*.
\$4,850,000 [Andrews’ portion: \$180,327] July 2021 – June 2024.
3. PI: **Joseph Andrews**, “Printable sensors for physical sensing applications,” *Cooper Standard Inc.*
\$80,949.00, May 2021 – April 2022.

Internal:**Active:**

1. PI: Jingyi Huang, Co-PI: **Joseph Andrews**, “In situ real-time soil nitrate leaching sensor for sustainable dairy production,” *UW Dairy Innovation Hub*
\$49,922 September 2021 – August 2022.
2. PI: **Joseph Andrews**, “Printed Silicon Carbide Thin-Film Transistors for High Resilience Active-Matrix Sensing,” *Fall Research Competition, WARF*.
\$44,852, September 2021 – August 2022.

ACADEMIC AND PROFESSIONAL SERVICE**Journal Reviewer**

IEEE Sensors, Transactions on Electron Devices, Advanced Intelligent Systems, Electron Device Letters, Advanced Electronic Materials, Advanced Science, Fibers, SN Applied Science

Academic Committees

ME Department Graduate Studies Committee

Conference Organizing Committees

IEEE International Conference on Flexible and Printable Sensors and Systems (IEEE FLEPS), publicity co-chair, 2021.

RESEARCH AND PROFESSIONAL EXPERIENCE**Assistant Professor****2019 – Present**

University of Wisconsin-Madison, Departments of Mechanical Engineering and Electrical and Computer Engineering

- Lead a team of graduate students in printed electronics research
- Establish interdisciplinary partnerships to address major research challenges
- Teach Mechanical and Electrical and Computer Engineering courses
- Support the research and educational initiatives within the college of Engineering at UW-Madison

Research Intern**2018**

Microsoft Applied Sciences Group

- Led a research project in a new technical space for Microsoft’s Applied Science Group
- Collaborated with a team to facilitate technical exploration and validation

Graduate Research Assistant**2015 – 2019**

Duke University, Advisor: Dr. Aaron Franklin

- Investigated nanomaterial inks for printed electronic systems and sensors.
- Developed advanced, fully-printed tire sensors to monitor both wear and pressure
- Advanced carbon nanotube thin-film transistors for bio-sensing applications.
- Established materials and integration techniques for flexible and stretchable electronics from liquid metals.

Undergraduate Research Assistant

2012 – 2015

University of South Carolina, Advisor: Dr. MVS Chandrashekar

- Investigated epitaxial graphene growth through solid state decomposition methods.
- Explored various graphene applications, specifically bacteria sensing through electrochemical impedance spectroscopy on graphene samples.

TEACHING EXPERIENCE

University of Wisconsin, Madison, WI

1. Instructor, ECE 376, Fall 2019, Spring 2020, Spring 2021, Undergraduate circuits course for non ECE majors.
2. Instructor, ME 368, Fall 2020, Undergraduate instrumentation and measurements course for ME majors.

Duke University, Durham, NC

1. Teaching Assistant, ECE 110, Circuits course for undergraduates
Received a certificate in college teaching through the Duke Graduate School.

COMMUNITY OUTREACH

Duke Interdisciplinary Social Innovators

2016-2018

Durham, NC

- Served in many roles including President (2018), Director of Partner Outreach (2017), and Project Manager (2016)
- As president fully led and organized a student organization of over 150 students
- Connected student teams to local non-profits to complete semester long, *pro bono* consulting projects
- Proactively sought funding to improve our organization's capacity and reach

After-school volunteer through Durham Parks and Recreation

2015-2017

Durham, NC

- Led after school science experiences to engage local children in science and technology
- Tutored and mentored individual children ages 5-12

After-school volunteer for Columbia Parks and Recreation

2013-2015

Columbia, SC

- Led music and sports activities for children ages 5 to 11
- Tutored and provided homework help for elementary school students

Grant writing intern for Zarephath Homeless Ministries

2011-2012

Columbia, SC

- Co-wrote a grant for \$10,000 dollars to develop a computer library and job training center for local homeless individuals through the Univ. of South Carolina

PROFESSIONAL SOCIETIES

- Institute of Electrical and Electronics Engineers (IEEE)
 - Member (2019)
 - Student member (2015-2019)
- American Society of Mechanical Engineers (ASME)
 - Member (2019)