Heikenfeld Vitae - Comprehensive (since 1998)

Jason C. Heikenfeld Professor of Electrical Engineering, Biomedical Engineering, Chemical Engineering, and VP Operations UC Office of Innovation.

Senior Member IEEE, Senior Member Society for Information Display, Life Member SPIE, Member ASEE, Member Sigma Xi, Fellow National Academy of Inventors.

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Google Scholar For an automatically updated listing of scholarly work:
http://scholar.google.com/citations?user=XT0lBpMAAAAJ

Expertise Device scientist/architect with particular strengths in rapid prototyping, electronic materials, microfluidics, electrofluidics, biosensors, electronic displays, flexible electronics, and optics. Our goals are not incremental or participatory, but rather, to introduce technologies that are disruptive.

Personal Statement I value my career by how much I can: inspire students to achieve their professional potential; advance the reputation of my university; contribute to vibrancy of my surrounding community. It is a privilege to be faculty at the Univ. of Cincinnati, a setting where I can pursue all of these aspirations to their fullest extent.

Education

2001 **Ph.D., Electrical Engineering**.
University of Cincinnati, Cincinnati, Ohio.
Thesis: *Rare earth-doped GaN flat panel display devices*.
Advisor: Prof. Andrew J. Steckl, Fellow IEEE.

1998 **B.S., Electrical Engineering**.
University of Cincinnati, Cincinnati, Ohio.
Minors: Photonics, Physics.

Major Professional Experience

2019-Pres. **University of Cincinnati**
Associate Vice President for Operations, UC Office of Innovation

2017-2019 **University of Cincinnati**
Assistant Vice President for Commercialization

2005-Pres. **University of Cincinnati**: 2005 – Asst. Prof / 2009 – Assoc. Prof. / 2013 – Full Prof.
Dept. of Electrical Engineering and Computing Systems, Director – Novel Devices Laboratory

2015-Pres. **Eccrine Systems Corp.,**
Chief Scientific Officer.
2013-2015 *Chief Technology Officer, Lead Founder.*
Currently at 60+ employees.

2009-2014 **Gamma Dynamics,**
Principal Scientist, Lead Founder –> up to 8 full-time employees. Winner - 2013 Frost & Sullivan Global Technology Innovation Leadership Award.
License exit to Fortune 50 company.

2010-2012 **Ohio Center for Microfluidic Innovation**

Founder, Director 2010-2012 -> $5.9M grant to build the center.

2001-2005 **Extreme Photonix,**
Principal Scientist, Co-founder
License Exit. Two distinct global products released by two licensees.

1996-1997 **3M Precision Optics Inc.**,
Projection Optics Fabrication Engineer

1995 **Hal Computer Systems Inc.,**
VLSI Design Engineer

Major Honors/Awards/Achievements

2019 - CEAS Research Award (highest career research award given in the UC college of Engineering).

2018 - Ohio Faculty Council Technology Commercialization Award (1 faculty award, statewide)

2017 - Selected for Univ. Bordeaux Visiting Scholars Program (summer 2017)
- Eccrine Systems Inc. named by Bloomberg as one of top 50 startups worldwide (metrics driven)
- Frost & Sullivan North American Technology Innovation Award (Eccrine Systems)

2016 - Earned the recognition as one of UC's top 3 Educators (all disciplines and campuses), and #1 in STEM, based on average of all online ratings tabulated by the UC News Record.

2015 - Ernst and Young Edge Award (Ohio Valley region: south-central Ohio / Illinois / Kentucky)
- Elected to the rank of Fellow: Univ. Cincinnati Graduate School

2014 - Elected to the rank of Fellow: National Academy of Inventors
- Elected to the rank of Fellow: Univ. Cincinnati Academy for Teaching and Learning

2013 - Sigma Xi Young Investigator Award (university – UC)
- Established Entrepreneur Award (university – UC)
- Master Educator (college – CEAS)
- Top 25 STEM Scholars in Ohio (all Ohio universities)
- Frost & Sullivan Global Technology Innovation Leadership Award (Gamma Dynamics)

2012 - Distinguished Engineering Researcher (college - CEAS)
- Eta Kappa Nu Outstanding Professor Award (school - SECS)
- William H. Middendorf Research Excellence Award (school - SECS)

2010 - University of Cincinnati Emerging Entrepreneur Award (university - UC)

2009 - Cincinnati Innovates, Taft Stettinius & Hollister Patent Award – 1st Place (273 entrants)

2009 - COE Research Award for Young Faculty (college - CEAS)
- Eta-Kappa-Nu Professor of the Year (school - SECS)

2008 - Neil Wandmacher Teaching Award for Young Faculty (college - CEAS)

2007 - NSF CAREER Award.

2007 - 1st Ever Recipient of All Three School Awards in the Same Year (>40 faculty)
- William E. Restemeyer Teaching Excellence Award
- William H. Middendorf Research Excellence Award
- Eta-Kappa-Nu Professor of the Year

2006 - AFOSR Young Investigator Award (one of only 21 awarded nationally across all sciences).

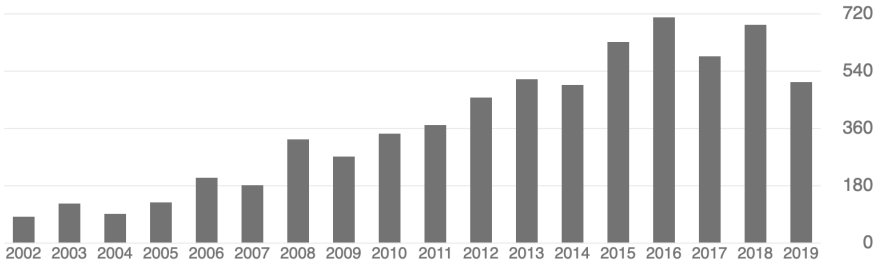
2005 - Developed technology and prototype in R&D Magazine Top 100 Award with IST Inc.

2001 - Completed a direct Ph.D. in 2 yrs. 10 mo., with 12 journal articles, 10 presentations, and multiple patents.

Publications *all are in IEEE bibliographic format*

Google Scholar Statistics *(as of September 1st, 2019)*

	All	Since 2014
Citations	6976	3616
h-index	44	30
i10-index	109	83



Books

1. F. Mugele and J. Heikenfeld – "Electrowetting" – Wiley, 2019.

Book Chapters

2. J. Heikenfeld, "Section 8- Paper-Like and Low Power Displays," in Handbook of Visual Display Technology. ed. Editorial Board, Canopus Academic Publishing, 2011.
3. J. Heikenfeld and M. Dhindsa, "Electrowetting on Superhydrophobic Surfaces: Present Status and Prospects," in Superhydrophobic Surfaces. ed. A. Carre and K. L. Mittall, 2008, ISBN 9789004165939.
4. P. D. Rack, J. Heikenfeld, and A. J. Steckl, "Inorganic electroluminescent displays," in Handbook of Luminescence and Display Materials and Devices. ed. B. R. Vaddi and H. S. Nalwa, Amer. Sci. Publishers, 2002.

Articles/ Proceedings *(as of September 1st, 2019)*

5. J Heikenfeld, A Jajack, B Feldman, SW Granger, S Gaitonde, G Begtrup, B. Katchman "Accessing analytes in biofluids for peripheral biochemical monitoring", Nature biotechnology, 1, 2019.
6. MC Brothers, M DeBrosse, CC Grigsby, RR Naik, SM Hussain, J. Heikenfeld, S. Kim "Achievements and Challenges for Real-Time Sensing of Analytes in Sweat within Wearable Platforms" Accounts of chemical research 52 (2), 297-306, 2019.
7. A Jajack, I Stamper, E Gomez, M Brothers, G Begtrup, J Heikenfeld, "Continuous, quantifiable, and simple osmotic preconcentration and sensing within microfluidic devices" PloS one 14 (1), e0210286, 2019.
8. J Francis, I Stamper, J Heikenfeld, EF Gomez, "Digital nanoliter to milliliter flow rate sensor with in vivo demonstration for continuous sweat rate measurement" Lab on a Chip 19 (1), 178-185, 2019.
9. A Hauke, S Ehrlich, L Levine, J Heikenfeld, "An Improved Design and Versatile New Lamination Fabrication Method for Twin Electrode Thin Layer Cells Utilizing Track-etch Membranes", Electroanalysis 31 (1), 58-65, 2019.
10. TD La Count, A Jajack, J Heikenfeld, GB Kasting, "Modeling glucose transport from systemic circulation to sweat" Journal of pharmaceutical sciences 108 (1), 364-371, 2019.
11. A Jajack, M Brothers, G Kasting, J Heikenfeld, "Enhancing glucose flux into sweat by increasing paracellular permeability of the sweat gland", PloS one 13 (7), e0200009, 2018.
12. A Hauke, P Simmers, YR Ojha, BD Cameron, R Ballweg, T Zhang, N. Twine, E. Gomez, J. Heikenfeld, "Complete validation of a continuous and blood-correlated sweat biosensing device with integrated sweat stimulation", Lab on a Chip 18 (24), 3750-3759, 2018.
13. NB Twine, RM Norton, MC Brothers, A Hauke, EF Gomez, J Heikenfeld,"Open nanofluidic films with rapid transport and no analyte exchange for ultra-low sample volumes", Lab on a Chip 18 (18), 2816-2825, 2018.
14. J Heikenfeld, A Jajack, J Rogers, P Gutruf, L Tian, T Pan, R Li, M Khine, J. Kim, J. Wang, J. Kim, "Wearable sensors: modalities, challenges, and prospects", Lab on a Chip 18 (2), 217-248, 2018.

15. P Simmers, SK Li, G Kasting, J Heikenfeld, “Prolonged and localized sweat stimulation by iontophoretic delivery of the slowly-metabolized cholinergic agent carbachol”, Journal of dermatological science 89 (1), 40-51, 2018.
16. P. Simmers, Y. Yuan, Z. Sonner, and J. Heikenfeld, “Membrane isolation of repeated-use sweat stimulants for mitigating both direct dermal contact and sweat dilution” Biomicrofluidics, vol. 034101, 2018.
17. A Hauke, LSS Kumar, MY Kim, J Pegan, M Khine, H Li, KW Plaxco, J. Heikenfeld , “Superwetting and aptamer functionalized shrink-induced high surface area electrochemical sensors”, Biosensors and Bioelectronics 94, 438-442, 2017.
18. SA Ventura, J Heikenfeld, T Brooks, L Esfandiari, S Boyce, Y Park, GB Kasting, “Cortisol extraction through human skin by reverse iontophoresis” Bioelectrochemistry 114, 54-60, 2017.
19. CB Eaker, ID Joshipura, LR Maxwell, J Heikenfeld, MD Dickey, “Electrowetting without external voltage using paint-on electrodes” Lab on a Chip 17 (6), 1069-1075, 2017.
20. AV Diebold, AM Watson, S Holcomb, C Tabor, D Mast, MD Dickey, J. Heikenfeld, “Electrowetting-actuated liquid metal for RF applications” Journal of Micromechanics and Microengineering 27 (2), 025010, 2017.
21. Z Sonner, E Wilder, T Gaillard, G Kasting, J Heikenfeld, “Integrated sudomotor axon reflex sweat stimulation for continuous sweat analyte analysis with individuals at rest”, Lab on a Chip 17 (15), 2550-2560, 2017.
22. R. Peng et al., “A new oil/membrane approach for integrated sweat sampling and sensing: sample volumes reduced from μL’s to nL’s and reduction of analyte contamination from skin,” Lab Chip, vol. 16, no. 22, pp. 4415–4423, 2016.
23. P. Schultz and J. Heikenfeld, “Enhanced optical discrimination system based on switchable retroreflective films,” Opt. Eng., vol. 55, no. 4, p. 45101, Mar. 2016.
24. L. S. S. Kumar, X. Wang, J. Hagen, R. Naik, I. Papautsky, and J. Heikenfeld, “Label free nano-aptasensor for interleukin-6 in protein-dilute bio fluids such as sweat,” Anal. Methods, vol. 8, no. 17, pp. 3440–3444, 2016.
25. J. Heikenfeld, “Non-invasive Analyte Access and Sensing through Eccrine Sweat: Challenges and Outlook circa 2016,” Electroanalysis, vol. 28, no. 6, pp. 1242–1249, Jun. 2016.
26. S. Holcomb et al., “Oxide-Free Actuation of Gallium Liquid Metal Alloys Enabled by Novel Acidified Siloxane Oils,” Langmuir, vol. 32, no. 48, pp. 12656–12663, Dec. 2016.
27. J. Heikenfeld, “Technological leap for sweat sensing,” Nature, vol. 529, no. 7587, pp. 475–476, Jan. 2016.
28. D. P. Rose et al., “Adhesive RFID Sensor Patch for Monitoring of Sweat Electrolytes,” IEEE Trans. Biomed. Eng., vol. 62, no. 6, pp. 1457–1465, Jun. 2015.
29. S. Mukherjee, W. L. Hsieh, N. Smith, M. Goulding, and J. Heikenfeld, “Electrokinetic pixels with biprimary inks for color displays and color-temperature-tunable smart windows,” Appl. Opt., vol. 54, no. 17, p. 5603, Jun. 2015.
30. A. C. Russell, W. L. Hsieh, K. C. Chen, and J. Heikenfeld, “Experimental and Numerical Insights into Isotropic Spreading and Deterministic Dewetting of Dielectrowetted Films,” Langmuir, vol. 31, no. 1, pp. 637–642, Jan. 2015.
31. B. L. Cumby, D. B. Mast, C. E. Tabor, M. D. Dickey, and J. Heikenfeld, “Robust Pressure-Actuated Liquid Metal Devices Showing Reconfigurable Electromagnetic Effects at GHz Frequencies,” IEEE Trans. Microw. Theory Tech., vol. 63, no. 10, pp. 3122–3130, Oct. 2015.
32. K. D. B. Dijkstra, J. Kipping, and N. Mézière, “Sixty new dragonfly and damselfly species from Africa (Odonata),” in Odonatologica, vol. 44, no. 4, Intergovernmental Panel on Climate Change, Ed. Cambridge: Cambridge University Press, 2015, pp. 447–678.
33. W.-L. Hsieh, K.-C. Chen, and J. Heikenfeld, “Sophisticated oil film geometries through incomplete electrical dewetting by feedback control and Fourier construction,” Lab Chip, vol. 15, no. 12, pp. 2615–2624, 2015.
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35. S. Mukherjee et al., “59.4L: Late-News Paper : The Biprimary Color System for E-Paper: Doubling Color Performance Compared to RGBW,” SID Symp. Dig. Tech. Pap., vol. 45, no. 1, pp. 869–872, Jun. 2014.
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37. A. Schultz, I. Papautsky, and J. Heikenfeld, “Investigation of Laplace Barriers for Arrayed Electrowetting Lab-on-a-Chip,” Langmuir, vol. 30, no. 18, pp. 5349–5356, May 2014.
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41. M. Hagedon, J. Heikenfeld, K. A. Dean, E. Kreit, K. Zhou, and J. Rudolph, “112.1: Invited Paper : Electrofluidic Imaging Films for Brighter, Faster, and Lower-Cost e-Paper,” SID Symp. Dig. Tech. Pap., vol. 44, no. 1, pp. 111–114, Jun. 2013.
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47. R. Zhao, B. Cumby, A. Russell, and J. Heikenfeld, “Large area and low power dielectrowetting optical shutter with local deterministic fluid film breakup,” Appl. Phys. Lett., vol. 103, no. 22, p. 223510, Nov. 2013.
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56. P. Schultz, B. Cumby, and J. Heikenfeld, “Investigation of five types of switchable retroreflector films for enhanced visible and infrared conspicuity applications,” Appl. Opt., vol. 51, no. 17, p. 3744, Jun. 2012.
57. J. August, “Official Monthly Publication of the Society for Information Display • www.informationdisplay.org Editorial : Celebrating 50 Years and Counting,” vol. 28, no. August, 2012.
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59. A. Banerjee, E. Kreit, Y. Liu, J. Heikenfeld, and I. Papautsky, “Reconfigurable virtual electrowetting channels,” Lab Chip, vol. 12, no. 4, pp. 758–764, 2012.
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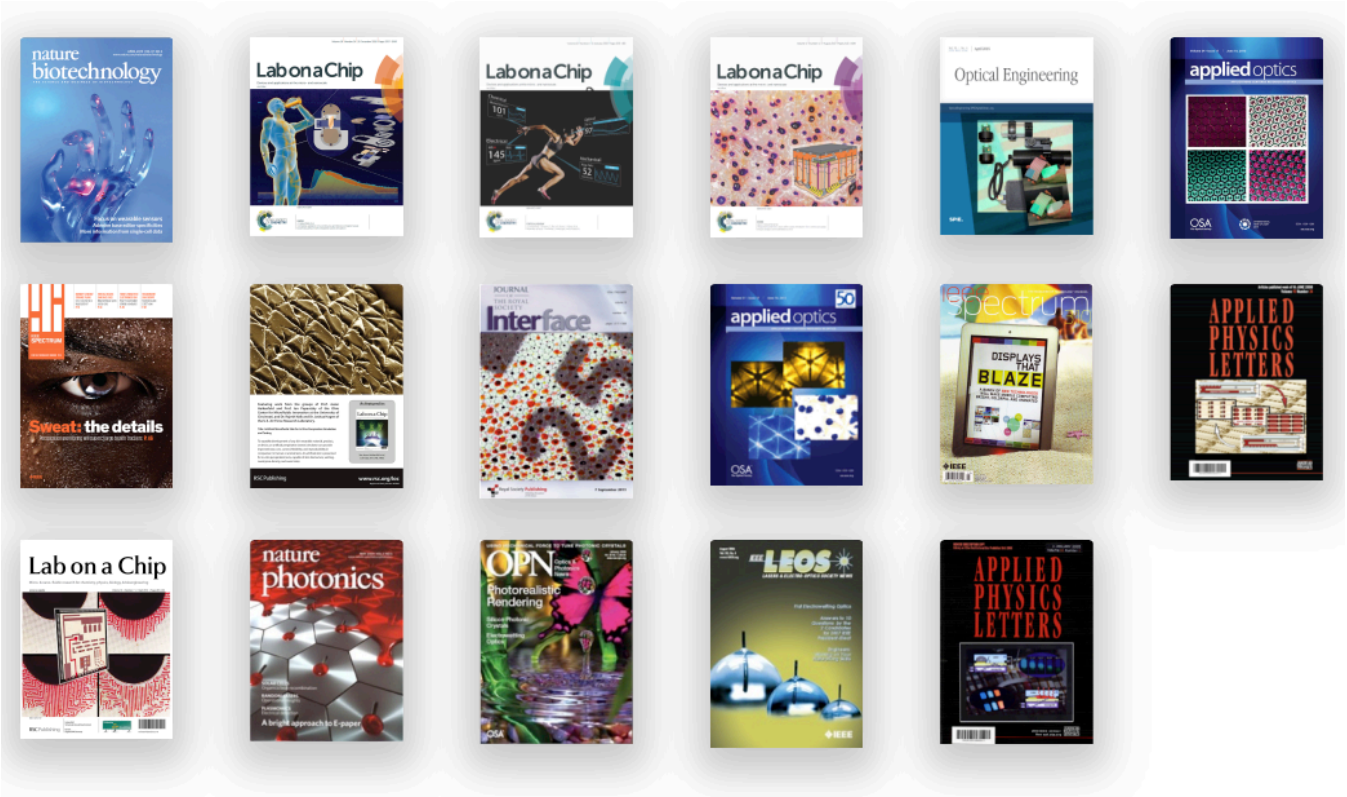

Presentations

Invited Presentations *(as of September 1st, 2019, invited seminars not included here)*

1. J. Heikenfeld, “Minimimally- and Non-Invasive Continuous Biosensing: Frontiers for Devices and Sensors”, Gore's Advanced Materials Day, San Jose CA, 2019.
2. J. Heikenfeld, “Minimimally- and Non-Invasive Continuous Biosensing: Frontiers for Devices and Sensors”, ACS National Meeting, San Diego, 2019.
3. J. Heikenfeld, “Eccrine Sweat Biomonitoring: Addressing Fundamental Challenges that Advance the Frontiers of Biosensing”, Gore's Digital Health Innovation Day, San Jose CA, 2018.
4. J. Heikenfeld, “Eccrine Sweat Biomonitoring: Addressing Fundamental Challenges that Advance the Frontiers of Biosensing”, Wearable Tech SF, Palo Alto California, 2018.
5. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead,” Select Bio Lab-on-Chip, Mumbai, India 2018.
6. J. Heikenfeld, “Eccrine Sweat Biomonitoring: Addressing Deep Fundamental Challenges that Advance the Frontiers of Biosensing”, Sandia National Labs, 2018.
7. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead”, P&G Global Innovation Event, Cincinnati Ohio.
8. J. Heikenfeld, “Conducting Human Subjects Research in a Basic Research Department,” OHRP Workshop 2017, Cincinnati Ohio, 2017.
9. J. Heikenfeld, “My Seizure Gauge – future roles for minimally- and non-invasive sensing modalities”, Epilepsy Foundation, Washington DC, 2017.
10. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead" in P&G Event, Cincinnati, OH, USA, 2017

11. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead" at LETI, Grenoble, France, 2017
12. J. Heikenfeld and Gavi Begtrup, “Wearable Sensors 2.0 – Advancing the Science and Commercialization of Sweat Biosensing” in Week of International Symposia, University of Bordeaux, Bordeaux, France, 2017
13. J. Heikenfeld, “Microfluidics as an Essential Tool for Understanding and Enabling Sensing of Analytes in Sweat" at the Microfluidics17 thematic school, Carcans, France, 2017
14. A. Hauke, A. Jajack and J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering the Real Challenges that Lie Ahead " at NSF workshop Sensing Health Symposium, Chicago, IL, USA, 2017
15. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead" in OSU Brain Summit, Columbus, OH, USA, 2017
16. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead" in NBMC BSW workshop, Arlington, VA, 2016
17. J. Heikenfeld, “Wearable Eccrine Sweat Biosensing: Uncovering The Real Challenges That Lie Ahead" at Point-of-Care Diagnostics & Global Health World Congress, San Diego, CA, 2016
18. J. Heikenfeld, “Sweat for Continuous Biomonitoring: Opportunities, Challenges, and Impact for Cognitive Performance Sensing" in OSU Brain Summit, Columbus, OH, USA, 2016
19. J. Heikenfeld, “Progress and Challenges in Sweat Biomarker Access On Skin" in SSIST SKIN WORKSHOP, Miami, FL, USA, 2016
20. J. Heikenfeld, “A Leap Beyond the Wearable’s of Today: Non-Invasive Biomarker Sensing Through Sweat" at Point-of-Care Conference, San Diego, CA, USA, 2015
21. A. Diebold and J. Heikenfeld, “Microfluidics and Antennas: Enabling the Next Generation of Epidermal Electronics” in IEEE International Symposium on Antennas and Propagation, Vancouver, Canada, 2015
22. J. Heikenfeld, “A Leap Beyond the Wearable’s of Today: Non-Invasive Biomarker Sensing Through Sweat" at Wearable Tech + Digital Health, New York City, NY, USA, 2015
23. J. Heikenfeld, “Changing the way that Wearables can track your Health through Sweat Sensors” in Internet of Things World 2015, San Francisco, CA, USA, 2015
24. Z. Sonner and J. Heikenfeld, “Sweat, Microfluidics, and Sensors: Making Wearables as Good as Implantable for Physiological Monitoring” at Wearable Technologies Conference 2015, Munich, Germany, 2015
25. J. Heikenfeld, "Physiological Monitoring Through Sweat: Vast Potential Enabled by New Technology and Insights" in *EMBS Micro and Nanotechnology in Medicine Conference*, Oshu, HI, USA, 2014.
26. J. Heikenfeld, plenary speaker, “Emerging Opportunities In Bringing Wearables into Intimate Contact With Skin and Sweat”, 2014 Biofusion MegaCoP Annual Symposium.
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31. J. Heikenfeld, "Wearable and Non-Invasive Patches for the Next Leap in Digital Health: Multi-Biomarker Access and Sensing," in *Printed Electronics*, San Francisco, CA, USA, 2013.
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70. A. Hauke, N. Twine, P. Simmers, Z. Sonner, R. Norton, and J. Heikenfeld, “An integrated microfluidic system for continuous wearable sweat sampling and sensing: solving issues with nL sample volumes and skin contamination” in MicroTAS 2017, Savannah, GA, USA, 2017
71. P. Simmers, K. Li, G. Kasting, J. Heikenfeld, “Greater Than 24 Hour Sweat Stimulation By Iontophoretic Delivery Of Carbachol For Continuous Biosensing” in BMES 2017 Annual Meeting, Phoenix, AZ, 2017
72. S. Holcomb, J. Heikenfeld, C. Tabor, “Designing Liquid Metal Interfaces for Stretchable Electronic Applications” in MRS 2017 Fall Meeting, Boston, MA, USA, 2017
73. Holcomb, S., Brothers, M., Diebold, A., Thatcher, W., Mast, D., Tabor, C., & Heikenfeld, J, “Acidic-Oil Enables a Breakthrough in Electrowetting of Liquid Metal Alloys”, International Meeting of Electrowetting, Taiwan, 2016
74. J. Heikenfeld, “Sweat Biosensing: technological breakthroughs enabling a new paradigm for continuous biomarker access” at HPR summit, Dayton, OH, USA, 2015
75. J. Heikenfeld, “A 100% Flipped Classroom” at CETL, Cincinnati, OH, USA, 2015
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Patents and Licensing

Dr. Heikenfeld has: submitted the most invention disclosures; has the most patents; and has licensed his inventions to more companies than any other faculty member in the history of the University of Cincinnati.

Patents

Dr. Heikenfeld has >100 granted and dozens of pending patents, but is currently not listing his granted or pending patents here. A listing of published U.S. only patents can be found here: https://patents.google.com/?inventor=Heikenfeld The reason the patents are not listed explicitly is that they could aid competitive analysis for our market competitors.

U.C. Invention Disclosures (162 invention disclosures in total)

2020-012 – Bi-component Thinner Hydrophobic Membranes for Biosensing
2020-001 – Microneedles Aided by Expanding Gel Tips
2019-091 - Device To Measure Fluid Exposure
2019-069 - Diffusion-Based Aptamer Sensing of ISF Without Motion Artifacts
2019-064 - Continuous Extraction And Sensing Of Interstitial Fluid
2019-063 - Continous Ex-Vivo Affinity-Based Sensing Of Interstitial Fluid
2019-061 - Volume modulated Preconcentration Device
2019-056 - Integrated devices to contin. measure bound and unbound analyte fractions in peripheral biofluids
2019-054 - Hydrophobic membrane auto-stops for vacuum-driven preconcentration systems
2019-053 - Water vapor exclusion in vacuum-actuated microfluidic devices
2019-052 - How to Use a Low-Cost Disposable to Turn A Smart Watch Into an Accurate Sweat Sensor
2019-041 - Membrane-based sample concentrator with enhanced coupling to absorbent materials
2019-038 - Sweat Rate Sensors Based on Measuring A Swellable Volume
2019-037 - Quality assurance of collected interstitial fluid samples
2019-036 - Interstitial fluid sensing using open and closed microfluidics
2019-032 - Mechanically Actuated Vacuum Preconcentration Device
2019-031 - Fast Osmotic Draw Systems For Use With Ion-Porous Membranes
2019-029 - Regulated And Shelf-Stable Vacuum Preconcentration Device
2019-023 – Hexagonal Nanofluidic Microchannels for Biofluid Sensing Devices – Joint with UC
2019-024 – 9 Inventions – Eccrine Systems Confidential Only
118-115 Prolonged Integrated Sweat Stimulation By Transdermal Diffusion
118-097 Ultrastable Dispersed Microdroplet Solutions For Hydrophobic Small Molecule And Gas Sensing
118-089 Membrane Enhanced Sensors
118-076 Discrete volume dosing system (DVDS) flow rate sensor
118-069 Repeatable Immunoassays
118-060 Hybrid Enzymatic Aptamer Sensors
118-050 Dry & Regulated Preconcentration
118-033 Sweat Rate Measurement Devices – Part I
118-031 Membrane-Coupled Continuous Sensing
118-022 Bubble Blocking Inlets
118-017 Digitized Sampling through Discrete Pulses and Volume Dispensing

118-016 Sweat Biosensing Companion Devices and Subsystems
118-011 Digitized Skin Product Sweat Testing
118-010 Prolonged and Localized Sweat Stimulation
118-003 Devices and Methods of Refreshing Draw Solution in Forward Osmosis-Based Sample Pre-conc.
117-070 7mer and 5mer
117-067 Delivery Of Reagents And Salt Management Devices
117-066 Modular Sample Preparation Devices
117-065 Controllable Concentration And Dilution Devices
117-045 Laminated Membrane Electrodes Manufacturing Process/Methods
117-035 Wearable Sweat Biosensing Devices With Active Sweat Sample Coupling
117-028 Aptamer Functionalized Shrink-Induced High Surface Area Electrochemical Sensors
117-027 Highly Deterministic Sweat Preconcentration
117-013 Sweat Sensing Devices With Temperature Regulation
117-012 Sweat Sensing Devices With Excess Sweat Flow Management
117-011 Sweat Sensing Devices With Concentration Regulation
117-009 Methods and Materials for Prolonged Sweat Stimulation
117-005 Sweat Sensing Devices With Concentration Regulation
117-003 Accurate Enzymatic Sensign Of Sweat Analytes
117-001 Reduced Sample Volume for Sensing of Analytes Generated by Reverse Iontophoresis
116-108 Devices With Reduced Microfluidic Volume Between Sensors And Sweat Glands
116-107 Device With Separate Sweat Management for Stimulation and Sensor Areas
116-104 Chemical Permeability Enhancers for Biomarker Extraction
116-087 Reverse Iontophoresis Devices With Reduced Sample Volumes and Reduced Sampling Intervals
116-082 Reverse Iontophoresis for Enhanced Analyte Flux Into Sweat
116-077 A Switchable Electrowetting Polarizer Enabled by Acidified Siloxane Oil
116-073 Advanced Biofluid Electroporation and Sensing Systems
116-070 Electroporation Enhanced Sweat Sensing With Low Duty Cycles
116-069 Modular Sweat Sensing Subsystems And Devices
116-068 Self Aligning Sweat Sensors
116-067 Head Mounted Sweat Sensing Technology
116-066 Electroporation Enhanced Saliva Sensing
116-054100TH Novel Device Lab Invention Disclosure :) (yes, that is the actual title, it was a team effort…)
116-051 Electroporation Enhanced Sweat Sensing
116-048 Sweat Sample Preconcentration by Forward Osmosis
116-041 Pneumonia Classification Device
116-032 Devices Capable of Sample Concentration for Extended Biosensing of Analytes in Sweat
116-027 Sweat Sensing Devices with Electromagnetically Shielded Sensors, Interconnects, and Electronics
116-021 Mechanically Co-located Sweat Stimulation and Sensing
116-008 Sweat Sensing Devices with Reduced Wicking Volume
115-130 Sweat Indication Of Physiological States
115-129 Sweat Sensor Cortisol Measurement
115-128 Smart Sweat Stimulation And Sensing Devices
115-110 Sweat Sensor with Analytical Assurance and Dry Calibration Media
115-106 Simplified Sudomotor Axon Reflex Sweating Sampling Device
115-105 Acidic Silicone Oil as an Insulating, Oxide-inhibiting medium for Gallium Alloys
115-102 Sensor-Centered Flow for Reduced Sweat Sampling Intervals
115-093 Indirect Diffusion-Based Sweat Stimulation
115-094 Porous sensors for solutes extracted by electric field
115-087 Sweat Sensing Devices With Reduced Collection Volumes
115-085 Sweat Sensing Devices With Reduced Sensor Volumes
115-083 Devices with Dissolvable Materials for Reduced Sweat Volumes
115-079 Indirect Sweat Stimulation Techniques For Continuous Health Monitoring
115-076 Devices with Reduced Sweat Volumes Between Sensors and Sweat Glands
115-067 Biomarker Sensing Devices Enabled by the Nature of Sweat Composition and Microfluidics
115-065 Agile Fluid Films
115-062 Multimode Smart Windows
115-042 Voltage Gated Reservoirs of Iontophoretic Substances for Transdermal Applications
115-041 Advanced Adhesives for Chronological Sweat Sensors
115-033 Sweat Stimulation Isolation and Integrated Impedance Sensing

115-030 Smart Trandermal Delivery Patch
115-023 Sweat Sensor With Analytical Assurance
115-002 Sweat Sensor With Chronological Assurance
115-001 Combinatorial Sensing of Sweat Biomarkers Using Simple Potentiometry and Impedance Measurements
114-094 Improved Technique And Device Design For Sweat Biomarker Analysis And Skin Electrical Properties
114-092 Microneedle Design For Simultaneous Iontophoretic Drug Delivery And Sweat Collection
114-091 Interdigitated Design For Drug Delivery And Simultaneous Sweat Collection For Transdermal Patches
114-084 Advanced Sweat Sensor Adhesion, Hermetic, and Fluidic Strategies
114-078 Sweat Stim. and Sensing Devices with Minimal Skin Biomarker Contam. and Min. Sweat Flow Rates
114-077 Device Construction for Prolonged and Reliable Sweat Stimulation and Sensing
114-067 Vertical Flow Impedance Sensing Membrane Devices
114-066 Sweat Monitoring of Product Delivery and Dosage
114-061 Easily-Scalable and Grayscale-Capable Two-Particle Electrophoretic Optical Device
114-029 Solute Introduction for Integrated or Repeated Biosensing
114-021 Sweat Simulation for Integrated or Repeated Biosensing
113-045 Simpler And More Transparent Electrofluidic Light Valve
112-014 Wearable Biomarker Sensors Using Non-invasive Sweat and Blood Access
111-019 A Pigment-Mixing Bi-Primary Color System For Electrophoretic Displays
111-013 Advanced Design for Electrofluidic Displays Requiring no Pixel Registration
111-006 Low Cost Thermocapillary Dosing Device
110-079 Partial Fluid Barriers: Non-Patterned and Electrically Grounded
110-076 Fast Response Electrofluidic Displays Requiring no Fluid Pixelation
110-055 Improved Transmissive Electrofluidic/Electrowetting Displays with > 1000:1 Contrast Ratio
110-050 Self-Contained Universal Retroreflector Tag Including Switchable Electo-Optic Diffuser
110038 A New Bi-Primary Color System for Electronic Paper with ~70% White Reflectance
110037 Agile Lab-On-a-Chip Enabled by Virtual Electrowetting Channels
110033 Two Liquid Dosing Techniques for Electrofluidic Displays
110031 Electrofluidic Pixel Reservoir with Pressure that is Symmetrically Balanced with Channel Operation
110004 Fluorescent Gel Gems
109061 Fast, Bistable, and 100% White Area Display Device and Methods for Making and Operating
109054 Printed and/or Bistable Electrofluidic Displays Driven with Parallel Electrowetting/Polymer Surfaces
109029 Advanced Electrofluidic Displays: (1) Spacer Teminated Bridge; (2) Low Capacitance Reservoir
109026 Preferred Embodiments for Optically Imaged Electrowetting Printing
109016 Electrowetting Retroreflector
108110 Cationic, Anionic and Catanionic Surfactants in Electrowetting
108099 Electrofluidic Chromatophores
108054 Universal Electrofluidic Antennas
108051 8-Electrode Electrowetting Microprism Arrays
108014 Arrayed Electrowetting Prisms and Method of Manufacture
107101 Electrowetting Retroreflector
107067 Electrowetting Delta-Prisms
107039 Nanocomposite Hydrophobic Dielectrics for Bistable Electrowetting Devices
107038 Pigment Dispersions for Electrowetting Displays and Methods of Oil Dosing
107037 Non-Mechanical and Zero-Power Interference Modulated Display
107036 Electrowetting Textiles for Tunable Color Surfaces and e-Paper
107035 Advanced Electrowetting Display Architectures, Materials, and Methods of Manufacturing
107012 Active Textiles for Fluid Movement
107001 Active Signage Enabled by Full-Color Light Wave Coupling Technology
106100 Cylindrical Electrowetting Systems for Flat Optics
106096 Bio Fuel Cell
106086 Arrayed Electrofluidic Membranes for Biomimetics, Biocountermeasures, Proteomics, and Drug Discovery
106080 Adaptive Electro-camouflage
106069 Electrofluidic Display Devices and Systems
106044 Electrofluidic Display Devices and Systems
106040 NanoLEDs: Dispersed Inorganic/Organic Nano-Junctions for Advanced Flat Solid State Lighting
106022 Electrofluidic Optical Steering Elements
106016 Sonofluidic Device
106010 Electrofluidic Textiles
104042 High Speed Electrowetting Light Valve

104016 Electronics Based on Liquid Components
103037 Information Display Based on Lightwave Coupling
103018 Impurity Based Electroluminescent Waveguide Amplifier
101019 Light Emissive Display with a Black or Color Dielectric Layer
100065 Electroluminescent Structure on Glass Using High Temperature Stable Phosphor and Thick Dielectric
100062 Phosphors of rare-earth-doped gallium nitride for thin film alternating current electroluminescent displays
099048 Polarity - Controlled Color Switching Electroluminescent Devices

Distinguished Service and Leadership

Industry

2018-Pres. BioOhio – ***Member of the Board***
2015-Pres. Eccrine Systems – ***Member of the Board, Chair of Scientific Advisory Board***
2013-2014 Tauriga Sciences- ***Scientific Advisory Board***
2013-2014 UC Technology Commercialization Accelerator – ***Governance Board***
2011-2013 See Real Technologies - ***Scientific Advisory Board***
2012-2013 Optilux Inc. – ***Scientific Advisory Board***

Professional Societies

2015-2018 IEEE EMBS - Technical Committee on Wearable Biomedical Sensors and Systems
2014 9th International Conference on Electrowetting – ***Chair and Host Organization***
2013-Pres. Soc. for Information Display – ***Member, e-Paper and Flexible Displays Subcommittee***
2013-Pres. Soc. for Information Display Magazine - ***Contributing Editor***
2012 Soc. for Information Display Magazine – ***Guest Editor, Feb./Mar. Issue***
2009-2012 Silicon – ***Associate Editor***
2009-2014 IEEE SPAC - ***National Speaker on Entrepreneurship***
2009 SPIE Congressional Science & Technology Team – ***Congressional Lobbyist***
2008 IEEE Photonics Society – ***Distinguished Lecture Committee***
2007-2013 IEEE J. Display Technology – ***Associate Editor***
2007-2010 IEEE Photonics Society – ***Board of Governors***

Notable Ranks: Fellow - National Academy of Inventors / Senior Member – IEEE / Senior Member SID.

Federal / State

2013-Pres. NSF I/UCRC – Center for Advanced Design and Manuf. of Integ. µ-Fluidics – ***Founding Member***
2009-2012 Ohio Center for Microfluidic Innovation ($5.9M) – ***Concept Lead / Founder, Director 2009-2012***
2010 NSF ERC - ***Site Reviewer***
2006-Pres. NSF ECCS Division - ***Regular NSF Panel Reviewer***

University

2017-Pres. UC Entrepreneurial Awards Committee, ***Chair***
2016 Presidents Committee on Innovation Strategy - ***Member***
2013 Provost Search Committee – ***President-Appointed Member***
2013 Supporting our Transformation / The Third Century: IP Visionary Committee ***- Chair***
2013-2014 Faculty Senate – ***At-Large Senator*** (1st elected from engineering in many years)
2013-2015 IPVC – ***Chair*** – *new models for supporting commercialization and business interactions.*
2013-2017 Intellectual Property Committee – ***Chair,*** *lead on BOT rule change to allow local investment in IP*
2012-2015 UC Forward – ***Founding Member, Conceptual Co-Lead***
2011-2013 UC3 Certificate In Innovation Transformation – ***Concept Lead / Founder***
2011 Performance Based Budgeting: Interdisciplinary Programs – ***Concept Lead / Member***
2010-2013 UC Innovation Council – ***Founding Member***

Fundraising

2008 Congressional Appropriations – Electrofluidic Camouflage, $3.0M - ***Lead***

College / School

2017-2019	Facutly Advisor to Engineering Tribunal (college-wide engineering student organization)
2015-2017	EECS Strategic Coordinator – ***Cofound*** of Org. Behavior App. to Achieving Dept. Excellence - initiated establishment of core values for dept. - revamped grad recruiting process - new peer observation model with 100% faculty participation
2013	Pilot Course for e-Learning Collaboration w/ Chongqing Univ. (one of two college-wide).
2013-2016	College Engin. & Appl. Sci. – ASSET: Accel. Stud. Succ. in E&T – ***Founder***
2013-2014	School of Elect. and Comp. Sys. - Development 2.0 – ***Concept Lead, Member***
2013-2014	College Engin. & Appl. Sci. – e-Learning Committee – ***Member***
2013	UC Engineers™ brand within UCRI - ***Concept Contributor / Co-Founder***
2010-2015	School of Elect. and Comp. Sys. - Graduate Council - ***Member***
2010-2017	School of Elect. and Comp. Sys. - Undergraduate Council - ***Member***
2007-2014	Men and Women in Engineering Week (H.S. Outreach Program) – ***Lead for the School***
2007-2014	School of Elect. and Comp. Sys. - Newsletter – ***Concept Lead, Editor***

** of significance because it is the1st segue for the college into required pedagogical faculty development. Model was adopted by A&S and became a campus wide effort.*

Community

2010-2013	GA Gradeschool School Council – ***Member, Chair in 2013***
2015-2017	GA Gradeschool Ed-Faith Board - ***Chair***

Key Mentors

This is a list of individuals that I am grateful to for their profound professional influence on me. There are other amazing individuals who are not listed here, simply because our overlap was not during a period where I was ready or fully receptive for new influence and growth. Chronologically: Dr. Andrew Steckl (excellence in research), Dr. Thomas Mantei (a higher responsibility to our stakeholders and society), Mr. Virgil Reed (emotional intelligence), Mr. Robert Beech (entrepreneurship and leadership), Mr. David Adams (leadership).

Notable Graduate and Undergraduate Achievements, Athletics

Ph.D.	University of Cincinnati Distinguished Graduate Assistantship (awarded to 5 graduate students university-wide). After completing the B.S. degree entered the direct Ph.D. program and completed the Ph.D. in 2 years, 10 months. Certified by University of Cincinnati Preparing Future Faculty Program.
B.S.	Predoctoral Honors Program
Athletics (College)	Track and field scholarship, 1994 Great Midwest Conference Indoor Distance Medley Champion, 1994-1996 Conference All-Academic Team.
Athletics (Post-College)	At age 37 finished 3rd out of 2400 competitors at 2012 Indiana Spartan Race Open obstacle/trail race. Key CrossFit benchmarks (~age 40): Murph – 36:30 / Fran – 3:29 / Amanda – 9:50 / 60 min row – 15,202 m / 14.4 - 8 Mus: 14 min AMRAP: 60-calorie row, 50 toes-to-bars, 40 wall-ball shots, 20 lb. to 10-foot target, 30 cleans, 135 lb., 20 muscle-ups.