

Stanford



Roger Howe

William E. Ayer Professor of Electrical Engineering

 Curriculum Vitae available Online

Bio

BIO

Design and fabrication of sensors and actuators using micro and nanotechnologies, with applications to information processing and energy conversion.

ACADEMIC APPOINTMENTS

- Professor, Electrical Engineering
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Acting Faculty Director, Stanford Nanofabrication Facility, (2020-2021)
- Faculty Director, Stanford Nanofabrication Facility, (2009-2017)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, National Academy of Engineering (2005 - present)

PROFESSIONAL EDUCATION

- PhD, UC Berkeley (1984)

LINKS

- <https://web.stanford.edu/~rthowe/>: <https://web.stanford.edu/~rthowe/>

Teaching

COURSES

2022-23

- An Intro to Making: What is EE: OSPBER 40M (Aut, Win, Spr)
- Engineering the Micro and Nano Worlds: From Chips to Genes: EE 17N (Spr)
- Integrated Circuit Fabrication Laboratory: EE 312 (Win)
- Introduction to Micro and Nano Electromechanical Systems: ENGR 240 (Win)

2021-22

- Advanced Micro and Nano Fabrication Laboratory: ENGR 241 (Spr)
- An Intro to Making: What is EE: OSPBER 40M (Spr)

- Engineering the Micro and Nano Worlds: From Chips to Genes: EE 17N (Spr)
- Introduction to Micro and Nano Electromechanical Systems: ENGR 240 (Win)

2020-21

- An Intro to Making: What is EE: ENGR 40M (Win, Spr)
- Introduction to Micro and Nano Electromechanical Systems: ENGR 240 (Aut)

2019-20

- Advanced Micro and Nano Fabrication Laboratory: ENGR 241 (Win)
- An Intro to Making: What is EE: ENGR 40M (Spr)
- Introduction to Micro and Nano Electromechanical Systems: ENGR 240 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Nicholas Bousse, Payton Broaddus, Kai Chang, Michelle Chen, Jasmine Cox, Saisneha Koppaka, Anand Lalwani, Akash Levy, Mo Wu, Maha Yusuf, Sofie de Olazarra

Doctoral (Program)

Savannah Eisner, Allan Raventos Knohr, Luke Upton, Eric Wu

Publications

PUBLICATIONS

- **"Deep approaches to learning" in a project-based nanofabrication graduate course** *JOURNAL OF THE SOCIETY FOR INFORMATION DISPLAY*
Tang, M., Kommera, S., Raghuram, U., Rincon, M., Xu, X., Fan, J., Howe, R. T.
2022
- **Optimized Deep Reactive-Ion Etching of Nanostructured Black Silicon for High-Contrast Optical Alignment Marks** *ACS APPLIED NANO MATERIALS*
Yusuf, M., Herring, G. K., Neustock, L., Zaman, M., Raghuram, U., Narasimhan, V. K., Chia, C., Howe, R. T.
2021; 4 (7): 7047-7061
- **Encapsulated Cell Dynamics in Droplet Microfluidic Devices with Sheath Flow.** *Micromachines*
Beshay, P. E., Ibrahim, A. M., Jeffrey, S. S., Howe, R. T., Anis, Y. H.
2021; 12 (7)
- **Interpretable Classification of Bacterial Raman Spectra with Knockoff Wavelets.** *IEEE journal of biomedical and health informatics*
Chia, C., Sesia, M., Ho, C. S., Jeffrey, S. S., Dionne, J. A., Candes, E., Howe, R. T.
2021; PP
- **Encapsulated Cell Dynamics in Droplet Microfluidic Devices with Sheath Flow** *MICROMACHINES*
Beshay, P. E., Ibrahim, A. M., Jeffrey, S. S., Howe, R. T., Anis, Y. H.
2021; 12 (7)
- **Modeling of Droplet Generation in a Microfluidic Flow-Focusing Junction for Droplet Size Control.** *Micromachines*
Ibrahim, A. M., Padovani, J. I., Howe, R. T., Anis, Y. H.
2021; 12 (6)
- **Electropermanent magnet-driven droplet size modulation for two-phase ferromicrofluidics** *MICROFLUIDICS AND NANOFUIDICS*
Padovani, J., Ibrahim, A. M., Jeffrey, S. S., Anis, Y. H., Howe, R. T.
2020; 24 (12)
- **A vibrating beam MEMS accelerometer for gravity and seismic measurements.** *Scientific reports*
Mustafazade, A., Pandit, M., Zhao, C., Sobrevela, G., Du, Z., Steinmann, P., Zou, X., Howe, R. T., Seshia, A. A.
2020; 10 (1): 10415

- **Neural network-based model of photoresist reflow** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Chia, C., Martis, J., Jeffrey, S. S., Howe, R. T.
2019; 37 (6)
- **Surface Photovoltage-Induced Ultralow Work Function Material for Thermionic Energy Converters** *ACS ENERGY LETTERS*
Schindler, P., Riley, D. C., Bargatin, I., Sahasrahudde, K., Schwede, J. W., Sun, S., Pianetta, P., Shen, Z., Howe, R. T., Melosh, N. A.
2019; 4 (10): 2436–43
- **Anomalous hysteresis and current fluctuations in cyclic voltammograms at microelectrodes due to Ag leaching from Ag/AgCl reference electrodes** *ELECTROCHEMISTRY COMMUNICATIONS*
Chia, C., Jeffrey, S. S., Howe, R. T.
2019; 105
- **ALD HfO₂ Films for Defining Microelectrodes for Electrochemical Sensing and Other Applications** *ACS APPLIED MATERIALS & INTERFACES*
Chia, C., Shulaker, M. M., Provine, J., Jeffrey, S. S., Howe, R. T.
2019; 11 (29): 26082–92
- **Micron-gap spacers with ultrahigh thermal resistance and mechanical robustness for direct energy conversion.** *Microsystems & nanoengineering*
Nicaise, S. M., Lin, C., Azadi, M., Bozorg-Grayeli, T., Adebayo-Ige, P., Lilley, D. E., Pfitzer, Y., Cha, W., Van Houten, K., Melosh, N. A., Howe, R. T., Schwede, J. W., Bargatin, et al
2019; 5: 31
- **Micron-gap spacers with ultrahigh thermal resistance and mechanical robustness for direct energy conversion** *MICROSYSTEMS & NANOENGINEERING*
Nicaise, S. M., Lin, C., Azadi, M., Bozorg-Grayeli, T., Adebayo-Ige, P., Lilley, D. E., Pfitzer, Y., Cha, W., Van Houten, K., Melosh, N. A., Howe, R. T., Schwede, J. W., Bargatin, et al
2019; 5
- **Quantum Tunneling Currents in a Nanoengineered Electrochemical System** *JOURNAL OF PHYSICAL CHEMISTRY C*
Gupta, C., Walker, R. M., Chang, S., Fischer, S. R., Seal, M., Murmann, B., Howe, R. T.
2017; 121 (28): 15085–105
- **Three-dimensional integration of nanotechnologies for computing and data storage on a single chip** *NATURE*
Shulaker, M. M., Hills, G., Park, R. S., Howe, R. T., Saraswat, K., Wong, H., Mitra, S.
2017; 547 (7661): 74+
- **Back-end-of-line compatible Poly-SiGe lateral nanoelectromechanical relays with multi-level interconnect**
Harrison, K. L., Clary, W. A., Provine, J., Howe, R. T.
SPRINGER.2017: 2125–30
- **Back-gated graphene anode for more efficient thermionic energy converters** *NANO ENERGY*
Yuan, H., Riley, D. C., Shen, Z., Pianetta, P. A., Melosh, N. A., Howe, R. T.
2017; 32: 67-72
- **Active control of probability amplitudes in a mesoscale system via feedback-induced suppression of dissipation and noise** *JOURNAL OF APPLIED PHYSICS*
Gupta, C., Perez, A. P., Fischer, S. R., Weinreich, S. B., Murmann, B., Howe, R. T.
2016; 120 (22)
- **A Super Stretchable Organic Thin-Film Diodes Network That Can Be Embedded Into Carbon Fiber Composite Materials for Sensor Network Applications** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Guo, Z., Aboudi, U., Peumans, P., Howe, R. T., Chang, F.
2016; 25 (3): 524-532
- **Electropermanent magnet actuation for droplet ferromicrofluidics.** *Technology*
Padovani, J. I., Jeffrey, S. S., Howe, R. T.
2016; 4 (2): 110-119
- **Design and fabrication of silicon-tessellated structures for monocentric imagers.** *Microsystems & nanoengineering*
Wu, T., Hamann, S. S., Ceballos, A. C., Chang, C. E., Solgaard, O., Howe, R. T.
2016; 2: 16019

- **Design and fabrication of silicon-tessellated structures for monocentric imagers** *MICROSYSTEMS & NANOENGINEERING*
Wu, T., Hamann, S. S., Ceballos, A. C., Chang, C., Solgaard, O., Howe, R. T.
2016; 2
- **Stable Encapsulated Charge-Biased Resonators** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Ng, E. J., Harrison, K. L., Yang, Y., Ahn, C. H., Hong, V. A., Howe, R. T., Kenny, T. W.
2016; 25 (1): 30-37
- **Engineering Ultra-Low Work Function of Graphene** *NANO LETTERS*
Yuan, H., Chang, S., Bargatin, I., Wang, N. C., Riley, D. C., Wang, H., Schwede, J. W., Provine, J., Pop, E., Shen, Z., Pianetta, P. A., Melosh, N. A., Howe, et al
2015; 15 (10): 6475-6480
- **Thermionic and photon-enhanced emission energy conversion**
Melosh, N., Riley, D., Sahasrabudde, K., Shen, Z. X., Schwede, J., Howe, R.
AMER CHEMICAL SOC.2015
- **Partitioning Electrostatic and Mechanical Domains in Nanoelectromechanical Relays** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Shavezipur, M., Harrison, K., Lee, W. S., Mitra, S., Wong, H. P., Howe, R. T.
2015; 24 (3): 592-598
- **Tunable control of antibody immobilization using electric field.** *Proceedings of the National Academy of Sciences of the United States of America*
Emaminejad, S., Javanmard, M., Gupta, C., Chang, S., Davis, R. W., Howe, R. T.
2015; 112 (7): 1995-1999
- **Integrated atomistic chemical imaging and reactive force field molecular dynamic simulations on silicon oxidation** *APPLIED PHYSICS LETTERS*
Dumpala, S., Broderick, S. R., Khalilov, U., Neyts, E. C., van Duin, A. C., Provine, J., Howe, R. T., Rajan, K.
2015; 106 (1)
- **Polyether Ether Ketone (PEEK) Fluidic Cell to Study Electrochemistry of Microelectrodes on Silicon Substrate** *ECS SOLID STATE LETTERS*
Arun, A., Gupta, C., Howe, R.
2015; 4 (10): P67-P71
- **Microfabricated Thermally Isolated Low Work-Function Emitter** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Lee, J., Bargatin, I., Vancil, B. K., Gwinn, T. O., Maboudian, R., Melosh, N. A., Howe, R. T.
2014; 23 (5): 1182-1187
- **Inherent Enhancement of Electronic Emission from Hexaboride Heterostructure** *PHYSICAL REVIEW APPLIED*
Voss, J., Vojvodic, A., Chou, S. H., Howe, R. T., Abild-Pedersen, F.
2014; 2 (2)
- **Improved Performance of Bottom-Contact Organic Thin-Film Transistor Using Al Doped HfO₂ Gate Dielectric** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Tang, W. M., Aboudi, U., Provine, J., Howe, R. T., Wong, H. P.
2014; 61 (7): 2398-2403
- **Optical MEMS: From Micromirrors to Complex Systems** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Solgaard, O., Godil, A. A., Howe, R. T., Lee, L. P., Peter, Y., Zappe, H.
2014; 23 (3): 517-538
- **DFT Study of Atomically-Modified Alkali-Earth Metal Oxide Films on Tungsten** *JOURNAL OF PHYSICAL CHEMISTRY C*
Chou, S. H., Voss, J., Vojvodic, A., Howe, R. T., Abild-Pedersen, F.
2014; 118 (21): 11303-11309
- **Double-Layer Silicon Photonic Crystal Fiber-Tip Temperature Sensors** *IEEE PHOTONICS TECHNOLOGY LETTERS*
Park, B., Jung, I. W., Provine, J., Gellineau, A., Landry, J., Howe, R. T., Solgaard, O.
2014; 26 (9): 900-903
- **Depletion of cells and abundant proteins from biological samples by enhanced dielectrophoresis** *17th International Conference on Solid-State Sensors, Actuators and Microsystems*
Javanmard, M., Emaminejad, S., Gupta, C., Provine, J., Davis, R. W., Howe, R. T.

ELSEVIER SCIENCE SA.2014: 918–24

- **Analysis of Asperity Dominated Contacts in Nanoelectromechanical Relays Using Thin Films**
Harrison, K. L., Dalvi, C., Asheghi, M., Howe, R. T., IEEE
IEEE.2014: 1256–60
- **STABLE CHARGE-BIASED CAPACITIVE RESONATORS WITH ENCAPSULATED SWITCHES**
Ng, E. J., Harrison, K. L., Everhart, C. L., Hong, V. A., Yang, Y., Ahn, C., Heinz, D. B., Howe, R. T., Kenny, T. W., IEEE
IEEE.2014: 1277–80
- **Vacuum encapsulated resonators for humidity measurement** *SENSORS AND ACTUATORS B-CHEMICAL*
Hennessy, R. G., Shulaker, M. M., Messana, M., Graham, A. B., Klejwa, N., Provine, J., Kenny, T. W., Howe, R. T.
2013; 185: 575-581
- **Laterally Actuated Platinum-Coated Polysilicon NEM Relays** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Parsa, R., Lee, W. S., Shavezipur, M., Provine, J., Maboudian, R., Mitra, S., Wong, H. P., Howe, R. T.
2013; 22 (3): 768-778
- **Thermionic current densities from first principles.** *journal of chemical physics*
Voss, J., Vojvodic, A., Chou, S. H., Howe, R. T., Bargatin, I., Abild-Pedersen, F.
2013; 138 (20): 204701-?
- **Thermionic current densities from first principles.** *journal of chemical physics*
Voss, J., Vojvodic, A., Chou, S. H., Howe, R. T., Bargatin, I., Abild-Pedersen, F.
2013; 138 (20): 204701-?
- **Combinational Logic Design Using Six-Terminal NEM Relays** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*
Lee, D., Lee, W. S., Chen, C., Fallah, F., Provine, J., Chong, S., Watkins, J., Howe, R. T., Wong, H. P., Mitra, S.
2013; 32 (5): 653-666
- **Photon-enhanced thermionic emission from heterostructures with low interface recombination.** *Nature communications*
Schwede, J. W., Sarmiento, T., NARASIMHAN, V. K., Rosenthal, S. J., Riley, D. C., Schmitt, F., Bargatin, I., Sahasrabudhe, K., Howe, R. T., Harris, J. S., Melosh, N. A., Shen, Z.
2013; 4: 1576-?
- **SUB-10 NANOMETER UNCOOLED PLATINUM BOLOMETERS VIA PLASMA ENHANCED ATOMIC LAYER DEPOSITION**
Purkl, F., English, T., Yama, G., Provine, J., Samarao, A. K., Feyh, A., O'Brien, G., Ambacher, O., Howe, R. T., Kenny, T. W., IEEE
IEEE.2013: 185–88
- **Photon-enhanced thermionic emission from heterostructures with low interface recombination.** *Nature communications*
Schwede, J. W., Sarmiento, T., NARASIMHAN, V. K., Rosenthal, S. J., Riley, D. C., Schmitt, F., Bargatin, I., Sahasrabudhe, K., Howe, R. T., Harris, J. S., Melosh, N. A., Shen, Z.
2013; 4: 1576-?
- **Dual-beam six-terminal nanoelectromechanical relays**
Harrison, K. L., Lee, W. S., Shavezipur, K., Provine, J., Mitra, S., Wong, H. P., Howe, R. T.
2013
- **Engineering an electrochemical sensor for the characterization of bond vibration frequencies of a chemical analyte.**
Gupta, C., Chang, S., Howe, R. T.
2013
- **Serpentine geometry for enhanced performance of nanometer-thin platinum bolometers**
Purkl, F., English, T., S., Yama, G., Provine, J., Samarao, A., Feyh, A., Howe, R. T.
2013
- **Ultra-thin atomic layer deposition films for corrosion resistance**
Haemmerli, A., J., Doll, J., C., Provine, J., Howe, R. T., Goldhaber-Gordon, D., Pruitt, B., L.
2013

- **Immobilization of antibodies on solid-state surfaces with controlled orientation using electric field**
Javanmard, M., Emaminejad, S., Gupta, C., Chang, S., Davis, R., W., Howe, R., T.
2013
- **Three stage sample preparation for purification of proteins from complex biological samples** *IEEE Sensors 2013, Baltimore, Maryland*
Javanmard, M., Emaminejad, S., Davis, R., W., Gupta, C., Howe, R., T.
2013: 1-4
- **Applications of nanonewton dielectrophoresis forces using atomic layer deposited oxides for microfluidic sample preparation and proteomics**
Emaminejad, S., Javanmard, M., Gupta, C., Dutton, R., W., Davis, R., W., Howe, R., T.
2013
- **Ultra dielectrophoresis: electrothermal analysis and its applications in microfluidic sample preparation and proteomics**
Emaminejad, S., Javanmard, M., Gupta, C., Davis, R., W., Howe, R., T.
2013
- **Capacitive Accelerometer Laboratory Using Polymer-Film Rapid Prototyping Technology** *3rd Interdisciplinary Engineering Design Education Conference (IEDEC)*
Gellineau, A. A., Rastegar, A. J., Howe, R. T.
IEEE.2013: 79-82
- **Microbead-separated thermionic energy converter with enhanced emission current** *PHYSICAL CHEMISTRY CHEMICAL PHYSICS*
Littau, K. A., Sahasrabudhe, K., Barfield, D., Yuan, H., Shen, Z., Howe, R. T., Melosh, N. A.
2013; 15 (34): 14442-14446
- **LATERALLY ACTUATED NANO-ELECTROMECHANICAL RELAYS WITH COMPLIANT, LOW RESISTANCE CONTACT** *26th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Shavezipur, M., Lee, W. S., Harrison, K. L., Provine, J., Mitra, S., Wong, H. P., Howe, R. T.
IEEE.2013: 520-523
- **An orbital-overlap model for minimal work functions of cesiated metal surfaces** *JOURNAL OF PHYSICS-CONDENSED MATTER*
Chou, S. H., Voss, J., Bargatin, I., Vojvodic, A., Howe, R. T., Abild-Pedersen, F.
2012; 24 (44)
- **A model for emission yield from planar photocathodes based on photon-enhanced thermionic emission or negative-electron-affinity photoemission** *JOURNAL OF APPLIED PHYSICS*
Sahasrabudhe, K., Schwede, J. W., Bargatin, I., Jean, J., Howe, R. T., Shen, Z., Melosh, N. A.
2012; 112 (9)
- **Control of DNA Capture by Nanofluidic Transistors** *ACS NANO*
Paik, K., Liu, Y., Tabard-Cossa, V., Waugh, M. J., Huber, D. E., Provine, J., Howe, R. T., Dutton, R. W., Davis, R. W.
2012; 6 (8): 6767-6775
- **Microencapsulation of silicon cavities using a pulsed excimer laser** *JOURNAL OF MICROMECHANICS AND MICROENGINEERING*
Sedky, S., Tawfik, H., Ashour, M., Graham, A. B., Provine, J., Wang, Q., Zhang, X. X., Howe, R. T.
2012; 22 (7)
- **Smart-cut layer transfer of single-crystal SiC using spin-on-glass** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Lee, J., Bargatin, I., Park, J., Milaninia, K. M., Theogarajan, L. S., Sinclair, R., Howe, R. T.
2012; 30 (4)
- **Single crystal silicon nanopillars, nanoneedles and nanoblades with precise positioning for massively parallel nanoscale device integration** *NANOTECHNOLOGY*
Roper, C. S., Gutes, A., Carraro, C., Howe, R. T., Maboudian, R.
2012; 23 (22)
- **A dry wafer-reconstitution process with zero insertion force by embedded alignment guide tabs** *JOURNAL OF MICROMECHANICS AND MICROENGINEERING*
Chen, J. P., Provine, J., Klejwa, N., Howe, R. T.
2012; 22 (6)

- **A micromachining-based technology for enhancing germanium light emission via tensile strain** *NATURE PHOTONICS*
Jain, J. R., Hryciw, A., Baer, T. M., Miller, D. A., Brongersma, M. L., Howe, R. T.
2012; 6 (6): 398-405
- **Optimal emitter-collector gap for thermionic energy converters** *APPLIED PHYSICS LETTERS*
Lee, J., Bargatin, I., Melosh, N. A., Howe, R. T.
2012; 100 (17)
- **Application of principal component analysis to a full profile correlative analysis of FTIR spectra** *SURFACE AND INTERFACE ANALYSIS*
Broderick, S. R., Suh, C., Provine, J., Roper, C. S., Maboudian, R., Howe, R. T., Rajan, K.
2012; 44 (3): 365-371
- **Electrical and Thermal Conduction in Atomic Layer Deposition Nanobridges Down to 7 nm Thickness** *NANO LETTERS*
Yoneoka, S., Lee, J., Liger, M., Yama, G., Kodama, T., Gunji, M., Provine, J., Howe, R. T., Goodson, K. E., Kennyt, T. W.
2012; 12 (2): 683-686
- **Integration of Nanoelectromechanical Relays With Silicon nMOS** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Chong, S., Lee, B., Mitra, S., Howe, R. T., Wong, H. P.
2012; 59 (1): 255-258
- **Nano-Electro-Mechanical Relays for FPGA Routing: Experimental Demonstration and a Design Technique**
Chen, C., Lee, W., Parsa, R., Chong, S., Provine, J., Watt, J., Howe, R. T., Wong, H., Mitra, S., IEEE
IEEE.2012: 1361-66
- **CVD hafnium diboride as a contact material for nano-electromechanical switches**
Lee, W., S., Cloud, A., N., Provine, J., Tayebi, N., Parsa, R., Mitra, S., Howe, R. T.
2012
- **Nano-electro-mechanical relays for FPGA routing: experimental demonstration and a design technique**
Chen, C., Lee, W., S., Parsa, R., Chong, S., Provine, J., Watt, J., Howe, R. T.
2012
- **Encapsulated thermionic energy converter with stiffened suspension**
Lee, J., H., Bargatin, I., Iwami, K., Littau, K., A., Vincent, M., Maboudian, R., Howe, R. T.
2012
- **Sidewall silicon carbide emitters for terahertz vacuum electronics**
Snapp, J. P., Lee, J., H., Provine, J., Bargatin, I., Maboudian, R., Lee, T., H., Howe, R. T.
2012
- **Electrochemical quantum tunneling for electronic detection and characterization of biological toxins**
Gupta, C., Walker, R., M., Gharpuray, R., Shulaker, M., M., Zhang, Z., Javanmard, M., Howe, R. T.
2012
- **Multiband charge-coupled device**
Chang, C., E., Siegel, J., D., Kenney, C., J., Roodman, A., J., Howe, R., T.
2012
- **Smart-cut layer transfer of single-crystal SiC using spin-on-glass** *J. Vacuum Sci. Tech. B: Microelectronics and Nanometer Structures*
Lee, J., H., Bargatin, Igor, I., Park, J., Milaninia, K., M., Theogarajan, L., S., Sinclair, R., Howe, R. T.
2012; 30: 42001
- **Multiband Charge-Coupled Device** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Chang, C., Segal, J. D., Roodman, A. J., Howe, R. T., Kenney, C. J.
IEEE.2012: 743-746
- **Electrochemical quantum tunneling for electronic detection and characterization of biological toxins** *Conference on Micro- and Nanotechnology Sensors, Systems, and Applications IV*
Gupta, C., Walker, R. M., Gharpuray, R., Shulaker, M. M., Zhang, Z., Javanmard, M., Davis, R. W., Murmann, B., Howe, R. T.

SPIE-INT SOC OPTICAL ENGINEERING.2012

- **Nano-Electro-Mechanical (NEM) Relays and their Application to FPGA Routing** *17th Asia and South Pacific Design Automation Conference (ASP-DAC)*
Chen, C., Lee, S., Provine, J., Chong, S., Parsa, R., Lee, D., Howe, R. T., Wong, H. P., Mitra, S.
IEEE.2012: 639–639
- **MICROFABRICATED SILICON CARBIDE THERMIONIC ENERGY CONVERTER FOR SOLAR ELECTRICITY GENERATION** *25th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Lee, J. H., Bargatin, I., Gwinn, T. O., Vincent, M., Littau, K. A., Maboudian, R., Shen, Z., Melosh, N. A., Howe, R. T.
IEEE.2012
- **Electrical Properties of CuPc-based OTFTs with Atomic Layer Deposited HfAlO Gate Dielectric** *8th IEEE International Conference on Electron Devices and Solid State Circuit (EDSSC)*
Tang, W. M., Aboudi, U., Provine, J., Howe, R. T., Wong, H. P.
IEEE.2012
- **Double-Layer Silicon Photonic Crystal Fiber Tip Temperature Sensor** *25th IEEE Photonics Conference (IPC)*
Park, B., Jung, I. W., Provine, J., Howe, R. T., Solgaard, O.
IEEE.2012: 550–551
- **Photonic Crystal Fiber Tip Sensor for High-Temperature Measurement** *IEEE SENSORS JOURNAL*
Park, B., Provine, J., Jung, I. W., Howe, R. T., Solgaard, O.
2011; 11 (11): 2643-2648
- **Tensile-strained germanium-on-insulator substrate fabrication for silicon-compatible optoelectronics** *OPTICAL MATERIALS EXPRESS*
Jain, J. R., Ly-Gagnon, D., Balram, K. C., White, J. S., Brongersma, M. L., Miller, D. A., Howe, R. T.
2011; 1 (6): 1121-1126
- **Multilayered Monolithic Silicon Photonic Crystals** *IEEE PHOTONICS TECHNOLOGY LETTERS*
Mallick, S. B., Jung, I. W., Meisner, A. M., Provine, J., Howe, R. T., Solgaard, O.
2011; 23 (11): 730-732
- **Highly Sensitive Monolithic Silicon Photonic Crystal Fiber Tip Sensor for Simultaneous Measurement of Refractive Index and Temperature** *JOURNAL OF LIGHTWAVE TECHNOLOGY*
Jung, I. W., Park, B., Provine, J., Howe, R. T., Solgaard, O.
2011; 29 (9): 1367-1374
- **AC Polarization for Charge-Drift Elimination in Resonant Electrostatic MEMS and Oscillators** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Bahl, G., Salvia, J. C., Melamud, R., Kim, B., Howe, R. T., Kenny, T. W.
2011; 20 (2): 355-364
- **Wafer-Level Epitaxial Silicon Packaging for Out-of-Plane RF MEMS Resonators with Integrated Actuation Electrodes** *IEEE TRANSACTIONS ON COMPONENTS PACKAGING AND MANUFACTURING TECHNOLOGY*
Chen, K., Wang, S., Salvia, J. C., Melamud, R., Howe, R. T., Kenny, T. W.
2011; 1 (3): 310-317
- **Electromechanical Sensing of Charge Retention on Floating Electrodes** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Elata, D., Leus, V., Provine, J., Hirshberg, A., Howe, R. T.
2011; 20 (1): 150-156
- **Magnetic, Mechanical, and Optical Characterization of a Magnetic Nanoparticle-Embedded Polymer for Microactuation** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Tsai, K. L., Ziaei-Moayyed, M., Candler, R. N., Hu, W., Brand, V., Klejwa, N., Wang, S. X., Howe, R. T.
2011; 20 (1): 65-72
- **NANOELECTROMECHANICAL RELAYS WITH DECOUPLED ELECTRODE AND SUSPENSION** *24th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Parsa, R., Shavezipur, M., Lee, W. S., Chong, S., Lee, D., Wong, H. P., Maboudian, R., Howe, R. T.
IEEE.2011: 1361–1364
- **A reel-to-reel printed accelerometer**

- Klejwa, N., Hennessy, R., G., Chen, J., W. P., Howe, R., T.
2011
- **Low thermal-budget silicon sealed-cavity microencapsulation process**
Sedky, S., Tawfik, H., Aziz, A., Abdel, ElSaegh, S., Graham, A., B., Provine, J., Howe, R. T.
2011
 - **Spacer technique for low-voltage, high-aspect-ratio lateral electrostatic actuators**
Lee, D., Mitra, S., Howe, R., T., Wong, H., S. P.
2011
 - **Vacuum microsystems for energy conversion and other applications**
Howe, R., T.
2011
 - **Atomic layer deposition of Al₂O₃ to protect carbon nanotubes for integration with top-down fabrication**
Shulaker, M., M., Provine, J., Howe, R., T., Mitra, S.
2011
 - **Effect of illumination on thermionic emission of microfabricated silicon carbide structures**
Lee, J., H., Bargatin, I., Provine, J., Liu, F., Seo, M., K., Maboudian, R., Howe, R. T.
2011
 - **Dual sidewall lateral nanoelectromechanical relays with beam isolation**
Lee, W., S., Chong, S., Parsa, R., Provine, J., Lee, D., Mitra, S., Howe, R. T.
2011
 - **Suppression of wear in cyclically loaded polycrystalline silicon via a thin silicon carbide coating**
Laboriante, I., Klejwa, N., Suwandi, A., Carraro, C., Howe, R., T., Maboudian, R.
2011
 - **Temperature dependence of vacuum encapsulated resonators for humidity measurement**
Hennessy, R., G., Shulaker, M., M., Messana, M., W., Graham, A., B., Klejwa, N., Provine, J., Howe, R. T.
2011
 - **Double-layered monolithic silicon photonic crystal fiber tip sensor**
Park, B., Jung, I., W., Provine, J., Howe, R., T., Solgaard, O.
2011
 - **ALD-METAL UNCOOLED BOLOMETER** *24th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Yoneoka, S., Liger, M., Yama, G., Schuster, R., Purkl, F., Provine, J., Prinz, F. B., Howe, R. T., Kenny, T. W.
IEEE.2011: 676–679
 - **Double-Layer Silicon Photonic Crystal Fiber Tip Sensor** *16th International Conference on Optical MEMS and Nanophotonics (OMN)*
Park, B., Jung, I. W., Provine, J., Shambat, G., Vuckovic, J., Howe, R. T., Solgaard, O.
IEEE.2011: 97–98
 - **Integration of Nanoelectromechanical (NEM) Relays with Silicon CMOS with Functional CMOS-NEM Circuit** *IEEE International Electron Devices Meeting (IEDM)*
Chong, S., Lee, B., Parizi, K. B., Provine, J., Mitra, S., Howe, R. T., Wong, H. P.
IEEE.2011
 - **Experimental Demonstration and Analysis of DNA Passage in Nanopore-based Nanofluidic Transistors** *IEEE International Electron Devices Meeting (IEDM)*
Paik, K., Liu, Y., Tabard-Cossa, V., Huber, D. E., Provine, J., Howe, R. T., Davis, R. W., Dutton, R. W.
IEEE.2011
 - **Differential internal dielectric transduction of a Lamé-mode resonator** *JOURNAL OF MICROMECHANICS AND MICROENGINEERING*
Ziaei-Moayyed, M., Elata, D., Quevy, E. P., Howe, R. T.
2010; 20 (11)

- **Photon-enhanced thermionic emission for solar concentrator systems** *NATURE MATERIALS*
Schwede, J. W., Bargatin, I., Riley, D. C., Hardin, B. E., Rosenthal, S. J., Sun, Y., Schmitt, F., Pianetta, P., Howe, R. T., Shen, Z., Melosh, N. A.
2010; 9 (9): 762-767
- **Characterization of Encapsulated Micromechanical Resonators Sealed and Coated With Polycrystalline SiC** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Yoneoka, S., Roper, C. S., Candler, R. N., Chandorkar, S. A., Graham, A. B., Provine, J., Maboudian, R., Howe, R. T., Kenny, T. W.
2010; 19 (2): 357-366
- **Model and Observations of Dielectric Charge in Thermally Oxidized Silicon Resonators** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Bahl, G., Melamud, R., Kim, B., Chandorkar, S. A., Salvia, J. C., Hopcroft, M. A., Elata, D., Hennessy, R. G., Candler, R. N., Howe, R. T., Kenny, T. W.
2010; 19 (1): 162-174
- **A Method for Wafer-Scale Encapsulation of Large Lateral Deflection MEMS Devices** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Graham, A. B., Messina, M. W., Hartwell, P. G., Provine, J., Yoneoka, S., Melamud, R., Kim, B., Howe, R. T., Kenny, T. W.
2010; 19 (1): 28-37
- **CHARGE-DRIFT ELIMINATION IN RESONANT ELECTROSTATIC MEMS** *23rd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2010)*
Bahl, G., Salvia, J., Bargatin, I., Yoneoka, S., Melamud, R., Kim, B., Chandorkar, S., Hopcroft, M. A., Bahl, R., Howe, R. T., Kenny, T. W.
IEEE.2010: 108-111
- **Electromechanical Sensing of Charge Retention on Floating Electrodes** *2010 IEEE Sensors Conference*
Elata, D., Leus, V., Hirshberg, A., Provine, J., Howe, R. T.
IEEE.2010: 1395-1398
- **Time evolution of released hole arrays into membranes via vacuum silicon migration**
Provine, J., Ferralis, N., Graham, A., B., Messina, M., W., Kang, R., Maboudian, R., Howe, R. T.
2010
- **Packaging of large lateral deflection MEMS using a combination of fusion bonding and epitaxial reactor sealing**
Messina, M., W., Graham, A., B., Yoneoka, S., Howe, R., T., Kenny, T., W.
2010
- **Four-mask process based on spacer technology for scaled-down electrostatic actuators**
Lee, D., Lee, W., S., Mitra, S., Howe, R., T., Wong, H., S. P.
2010
- **Vacuum encapsulated resonators for humidity measurement**
Hennessy, R., G., Shulaker, M., M., Melamud, R., Klejwa, N., Chandorkar, S., Kim, B., Howe, R. T.
2010
- **Heterodyned electrostatic transduction oscillators evade low frequency noise aliasing**
Bahl, G., Salvia, J., Lee, H., K., Melamud, R., Kim, B., Howe, R., T.
2010
- **Single-step, wafer-scale, hermetic sealing using silicon migration, to be presented at the**
Kant, R., Choo, H., Howe, R., T.
2010
- **Composite polysilicon-platinum lateral nanoelectromechanical relays**
Parsa, R., Akarvardar, K., Provine, J., Lee, D., Elata, D., Mitra, S., Howe, R. T.
2010
- **2D analytical model for the study of NEM relay device scaling**
Shen, X., Chong, S., Lee, D., Parsa, R., Howe, R., T., Wong, H., S. P.
2010
- **Non-adiabatic electronic relaxation events at monolayer-modified electrode-electrolyte interfaces: physics and applications**
Gupta, C., Howe, R., T., Shannon, M., A.

2010

- **Efficient FPGAs using Nanoelectromechanical Relays** *18th ACM International Symposium on Field-Programmable Gate Arrays*
Chen, C., Parsa, R., Patil, N., Chong, S., Akarvardar, K., Provine, J., Lewis, D., Watt, J., Howe, R. T., Wong, H. P., Mitra, S.
ASSOC COMPUTING MACHINERY.2010: 273–282
- **TITANIUM NITRIDE SIDEWALL STRINGER PROCESS FOR LATERAL NANO-ELECTROMECHANICAL RELAYS** *23rd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2010)*
Lee, D., Lee, W. S., Provine, J., Lee, J., Yoon, J., Howe, R. T., Mitra, S., Wong, H. P.
IEEE.2010: 456–459
- **High Temperature Photonic Crystal Fiber Tip Sensor** *2010 IEEE Sensors Conference*
Park, B., Provine, J., Howe, R. T., Solgaard, O., Jung, I. W.
IEEE.2010: 970–974
- **Monolithic Silicon Photonic Crystal Fiber Tip Sensor for Refractive Index and Temperature Sensing** *Conference on Lasers and Electro-Optics (CLEO)/ Quantum Electronics and Laser Science Conference (QELS)*
Park, B., Jung, I. W., Provine, J., Howe, R. T., Solgaard, O.
IEEE.2010
- **Higher-order Dielectrically Transduced Bulk-mode Ring Resonator with Low Motional Resistance** *2010 IEEE International Frequency Control Symposium*
Ziaei-Moayyed, M., Howe, R. T.
IEEE.2010: 19–24
- **pH Sensor Demonstrating a Layout Programmable Squeeze Pumped Microfluidic Platform** *2010 IEEE Sensors Conference*
Klejwa, N., Provine, J., Howe, R. T.
IEEE.2010: 936–939
- **EFFICIENT INTERNAL ELECTROSTATIC TRANSDUCTION OF THE 41(ST) RADIAL MODE OF A RING RESONATOR** *23rd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2010)*
Ziaei-Moayyed, M., Quevy, E. P., Hsieh, J., Howe, R. T.
IEEE.2010: 711–714
- **Laser print patterning of planar spiral inductors and interdigitated capacitors** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Klejwa, N., Misra, R., Provine, J., Howe, R. T., Klejwa, S. J.
2009; 27 (6): 2745-2749
- **Performance Evaluation and Equivalent Model of Silicon Interconnects for Fully-Encapsulated RF MEMS Devices** *IEEE TRANSACTIONS ON ADVANCED PACKAGING*
Chen, K., Salvia, J., Potter, R., Howe, R. T., Kenny, T. W.
2009; 32 (2): 402-409
- **Electrical and Mechanical Characterization of Doped and Annealed Polycrystalline 3C-SiC Thin Films** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Roper, C. S., Radmilovic, V., Howe, R. T., Maboudian, R.
2009; 156 (1): D5-D10
- **WAFER SCALE ENCAPSULATION OF LARGE LATERAL DEFLECTION MEMS STRUCTURES** *22nd International Conference on Micro Electro Mechanical Systems (MEMS)*
Graham, A. B., Messana, M., Hartwell, P., Provine, J., Yoneoka, S., Kim, B., Melamud, R., Howe, R. T., Kenny, T. W.
IEEE.2009: 745–748
- **FULLY DIFFERENTIAL INTERNAL ELECTROSTATIC TRANSDUCTION OF A LAME-MODE RESONATOR** *22nd International Conference on Micro Electro Mechanical Systems (MEMS)*
Ziaei-Moayyed, M., Elata, D., Hsieh, J., Chen, J. P., Quevy, E. P., Howe, R. T.
IEEE.2009: 931–934
- **EPITAXIAL SILICON MICROSHELL VACUUM-ENCAPSULATED CMOS-COMPATIBLE 200 MHz BULK-MODE RESONATOR** *22nd International Conference on Micro Electro Mechanical Systems (MEMS)*
Chen, K., Chandrahali, H., Graham, A. B., Bhave, S. A., Howe, R. T., Kenny, T. W.
IEEE.2009: 23–26

- **Magnetic nanoparticle-driven pumping in microchannels**
Tsai, K., L., Pickard, D., Kao, J., Yin, X., Leen, B., Knutson, K., Howe, R. T.
2009
- **Thermionic emission from microfabricated silicon carbide filaments**
Lee, J., H., Bargatin, I., Provine, J., Howe, R., T., Clay, W., A., Melosh, N., A.
2009
- **Structural transformation of silicon due to hydrogen ambient during germanium epitaxy on silicon nano-pillars**
Thareja, G., Kant, R., Howe, R., Nishi, Y.
2009
- **Nanoelectromechanical (NEM) relays integrated with SRAM for improved stability and low leakage**
Chong, S., Akarvardar, K., Parsa, R., Yoon, J., B., Howe, R., T., Mitra, S.
2009
- **Laser print patterning of planar spiral inductors**
Klejwa, N., Misra, R., Klejwa, S., J., Howe, R., T.
2009
- **Suspended microstructures made using silicon microstructures**
Kant, R., Ziaei-Moayyed, M., Howe, R., T.
2009
- **Simultaneous wafer-scale vacuum encapsulation and microstructure cladding with LPCVD polycrystalline 3C-SiC**
Roper, C., S., Candler, R., Yoneoka, S., Kenny, T., Howe, R., T., Maboudian, R.
2009
- **Encapsulated out-of-plane differential square-plate resonators with integrated actuation electrodes**
Chen, K., L., Wang, S., Salvia, J., Howe, R., T., Kenny, T., W.
2009
- **Wafer reconstitution with precision dry front-to-front registration**
Chen, J., W. P., Howe, R., T.
2009
- **Microfluidic device with integrated nanopores for protein detection**
Zangle, T., A., Kant, R., Howe, R., T., Santiago, J., G.
2009
- **Laser-printed magnetic-polymer microstructures**
Klejwa, N., Misra, R., Provine, J., Klejwa, S., J., Zhang, M., Wang, S., X., Howe, R. T.
2009
- **Epitaxial growth of graphene on high topology SiC structures patterned by focused ion beam**
Provine, J., Ferralis, N., Klejwa, N., Carraro, C., Maboudian, R., Howe, R., T.
2009
- **Higher-order mode internal electrostatic transduction of a bulk-mode ring resonator on a quartz substrate**
Ziaei-Moayyed, M., Hsieh, J., Chen, J., W. P., Quévy, E., P., Elata, D., Howe, R., T.
2009
- **Monolithic Silicon Photonic Crystal Slab Fiber Tip Sensor**
Jung, I., W., Park, B., Provine, J., Howe, R., T., Solgaard, O.
2009
- **Photonic Crystal Fiber Tip Sensor for Precision Temperature Sensing** *22nd Annual Meeting of the IEEE-Photonics-Society*
Jung, I. W., Park, B., Provine, J., Howe, R. T., Solgaard, O.
IEEE.2009: 761–762

- **Room-Temperature Wet Etching of Polycrystalline and Nanocrystalline Silicon Carbide Thin Films with HF and HNO₃** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Roper, C. S., Howe, R. T., Maboudian, R.
2009; 156 (3): D104-D107
- **Experimental Investigation of Silicon Surface Migration in Low Pressure Nonreducing Gas Environments** *ELECTROCHEMICAL AND SOLID STATE LETTERS*
Kant, R., Ferralis, N., Provine, J., Maboudian, R., Howe, R. T.
2009; 12 (12): H437-H440
- **Characterization of polycrystalline 3C-SiC films deposited from the precursors 1,3-disilabutane and dichlorosilane** *JOURNAL OF APPLIED PHYSICS*
Roper, C. S., Radmilovic, V., Howe, R. T., Maboudian, R.
2008; 103 (8)
- **Technologies for cofabricating MEMS and electronics** *PROCEEDINGS OF THE IEEE*
Fedder, G. K., Howe, R. T., Liu, T. K., Quevy, E. P.
2008; 96 (2): 306-322
- **Effects of annealing on residual stress and strain gradient of doped polycrystalline SiC thin films** *ELECTROCHEMICAL AND SOLID STATE LETTERS*
Roper, C. S., Radmilovic, V., Howe, R. T., Maboudian, R.
2008; 11 (4): D35-D37
- **Silicon nanowire coupled micro-resonators** *21st IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2008)*
Arellano, N., Quevy, E. P., Provine, J., Maboudian, R., Howe, R. T.
IEEE.2008: 721-724
- **Observations of fixed and mobile charge in composite MEMS resonators**
Bahl, G., Melamud, R., Kim, B., Chandorkar, S., Salvia, J., Hopcroft, M., A., Howe, R. T.
2008
- **Energy-reversible complementary NEM logic gates**
Arkarvardar, K., Elata, D., Howe, R., T., Wong, H., S. P.
2008
- **Characterization of magnetic nanoparticle-embedded SU8 for microactuation**
Tsai, K., L., Ziaei-Moayyed, M., Klejwa, N., Candler, R., N., Hu, W., Wang, S., X., Howe, R. T.
2008
- **Measuring charge and charge-decay in floating electrode electrostatic MEMS actuators**
Elata, D., Hennessy, R., Leus, V., Klejwa, N., Hirshberg, A., Provine, J., Howe, R. T.
2008
- **Nanowire coupled micro-resonators**
Arellano, N., Quévy, E., P., Provine, J., Maboudian, R., Howe, R., T.
2008
- **The Dependence of Poly-crystalline SiC Mid-Infrared Optical Properties on Deposition Conditions** *IEEE/LEOS International Conference on Optical MEMS and Nanophotonics*
Provine, J., Roper, C., Schuller, J. A., Brongersma, M. L., Maboudian, R., Howe, R. T.
IEEE.2008: 182-183
- **Interface Quality Control of Monolithic Photonic Crystals by Hydrogen Annealing** *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference (CLEO/QELS 2008)*
Kim, S., Kant, R., Hadzialic, S., Howe, R. T., Solgaard, O.
IEEE.2008: 316-317
- **Analytical modeling of the suspended-gate FET and design insights for low-power logic** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Akarvardar, K., Eggimann, C., Tsamados, D., Chauhan, Y. S., Wan, G. C., Lonescu, A. M., Howe, R. T., Wong, H. P.
2008; 55 (1): 48-59

- **Characterization of boron-doped micro- and nanocrystalline diamond films deposited by wafer-scale hot filament chemical vapor deposition for MEMS applications** *DIAMOND AND RELATED MATERIALS*
Zhang, J., Zimmer, J. W., Howe, R. T., Maboudian, R.
2008; 17 (1): 23-28
- **Electrical, mechanical and metal contact properties of polycrystalline 3C-SiC films for MEMS in harsh environments** *16th European Conference on Chemical Vapor Deposition*
Zhang, J., Carraro, C., Howe, R. T., Maboudian, R.
ELSEVIER SCIENCE SA.2007: 8893-98
- **Nickel and platinum ohmic contacts to polycrystalline 3C-silicon carbide** *MATERIALS SCIENCE AND ENGINEERING B-SOLID STATE MATERIALS FOR ADVANCED TECHNOLOGY*
Zhang, J., Howe, R. T., Maboudian, R.
2007; 139 (2-3): 235-239
- **Mode shape imaging of out-of-plane and in-plane vibrating RF micromechanical resonators by atomic force microscopy** *32nd International Conference on Micro- and Nano-Engineering*
San Paulo, A., Quevy, E., Black, J., Howe, R. T., White, R., Bokor, J.
ELSEVIER SCIENCE BV.2007: 1354-57
- **Suspended mechanical structures based on elastic silicon nanowire arrays** *NANO LETTERS*
San Paulo, A., Arellano, N., Plaza, J. A., He, R., Carraro, C., Maboudian, R., Howe, R. T., Bokor, J., Yang, P.
2007; 7 (4): 1100-1104
- **Characterization of polycrystalline silicon-germanium film deposition for modularly integrated MEMS applications** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Low, C. W., Liu, T. K., Howe, R. T.
2007; 16 (1): 68-77
- **Extraordinary transmission through a poly-SiC membrane with subwavelength hole arrays** *IEEE/LEOS International Conference on Optical MEMS and Nanophotonics*
Provine, J., Catrysse, P. B., Roper, C., Maboudian, R., Fan, S., Howe, R. T.
IEEE.2007: 157-158
- **WetFET - A novel fluidic gate-dielectric transistor for sensor applications** *International Symposium on VLSI Technology, Systems and Applications*
Lee, D., Sun, X., Quevy, E., Howe, R. T., Liu, T. K.
IEEE.2007: 124-125
- **Aqueous transduction of poly-sige disk resonators** *14th International Conference on Solid-State Sensors, Actuators and Microsystems/21st European Conference on Solid-State Transducers*
Chandrahaling, H., Bhave, S. A., Quevy, E. P., Howe, R. T.
IEEE.2007
- **Suspended mechanical structures based on elastic silicon nanowire arrays** *Nano Letters*
Paulo, A., San, Arellano, N., Plaza, J., A., He, R., Carraro, C., Maboudian, R., Howe, R. T.
2007; 7: 1100-1104
- **Aqueous transduction of poly-SiGe disk resonators**
Chandrahaling, H., Bhave, S., A., Quévy, E., P., Howe, R., T.
2007
- **Characterization of polycrystalline silicon-germanium film deposition for modularly integrated MEMS applications** *IEEE/ASME J. Microelectromechanical Systems*
Low, C., W., King Liu, T., J., Howe, R., T.
2007; 16: 68-77
- **Design considerations for complementary nanoelectromechanical logic gates** *IEEE International Electron Devices Meeting*
Akarvardar, K., Elata, D., Parsa, R., WAN, G. C., Yoo, K., Provine, J., Peurnans, P., Howe, R. T., Wong, H. P.
IEEE.2007: 299-302

- **Effect of a vertical stack of aligned subwavelength metal hole arrays on extraordinary transmission spectra** *IEEE/LEOS International Conference on Optical MEMS and Nanophotonics*
Provine, J., Kant, R., Horsley, D. A., Howe, R. T.
IEEE.2007: 117–118
- **Phonon polariton reflectance spectra in a silicon carbide membrane hole array** *20th Annual Meeting of the IEEE-Lasers-and-Electro-Optics-Society*
Provine, J., Catrysse, P. B., Roper, C. S., Maboudian, R., Fan, S., Howe, R. T.
IEEE.2007: 466–467
- **Stress control of polycrystalline 3C-SiC films in a large-scale LPCVD reactor using 1,3-disilabutane and dichlorosilane as precursors** *JOURNAL OF MICROMECHANICS AND MICROENGINEERING*
Roper, C. S., Howe, R. T., Maboudian, R.
2006; 16 (12): 2736-2739
- **Modal coupling in micromechanical vibratory rate gyroscopes** *IEEE SENSORS JOURNAL*
Phani, A. S., Seshia, A. A., Palaniapan, M., Howe, R. T., Yasaitis, J. A.
2006; 6 (5): 1144-1152
- **Control of strain gradient in doped polycrystalline silicon carbide films through tailored doping** *JOURNAL OF MICROMECHANICS AND MICROENGINEERING*
Zhang, J., Howe, R. T., Maboudian, R.
2006; 16 (10): L1-L5
- **Polycrystalline silicon carbide as a substrate material for reducing adhesion in MEMS** *TRIBOLOGY LETTERS*
Gao, D., Carraro, C., Howe, R. T., Maboudian, R.
2006; 21 (3): 226-232
- **Single-source chemical vapor deposition of SiC films in a large-scale low-pressure CVD growth, chemical, and mechanical characterization reactor** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Roper, C. S., Radmilovic, V., Howe, R. T., Maboudian, R.
2006; 153 (8): C562-C566
- **Back-end-of-line poly-SiGe disk resonators** *19th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2006)*
Quevy, E. P., Paulo, A., Basol, E., Howe, R. T., King, T. J., Bokor, G.
IEEE.2006: 234–237
- **Reconstituted wafer technology for heterogeneous integration** *19th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2006)*
Quevy, E. P., Howe, R. T., King, T. J.
IEEE.2006: 302–305
- **Electrical characterization of n-type polycrystalline 3C-silicon carbide thin films deposited by 1,3-disilabutane** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Zhang, J. C., Howe, R. T., Maboudian, R.
2006; 153 (6): G548-G551
- **Back-end-of-line poly-SiGe disk resonators**
Quévy, E. P., Paulo, A., San, Basol, E., Howe, R., T., King, T., J., Bokor, J.
2006
- **Electrical characterization of n-type polycrystalline 3C-silicon carbide thin films deposited by 1,3-disilabutane** *J. Electrochem. Soc.*
Zhang, J., C., Howe, R., T., Maboudian, R.
2006; 153: G548-G551
- **Reconstituted wafer technology for heterogeneous integration**
Quévy, E. P., Howe, R., T., King, T., J.
2006
- **Microfluidic generation of tunable monodisperse double emulsions for templated silica particles**
Zendejas, F., J., Srinivasan, U., Holtz, W., J., Keasling, J., D., Howe, R., T.
2006

- **Thermal budget limits of quarter-micrometer foundry CMOS for post-processing MEMS devices** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Takeuchi, H., Wung, A., Sun, X., Howe, R. T., King, T. J.
2005; 52 (9): 2081-2086
- **Mechanical elasticity of single and double clamped silicon nanobeams fabricated by the vapor-liquid-solid method** *APPLIED PHYSICS LETTERS*
San Paulo, A., Bokor, J., Howe, R. T., He, R., Yang, P., Gao, D., Carraro, C., Maboudian, R.
2005; 87 (5)
- **Selective growth of Si nanowire arrays via galvanic displacement processes in water-in-oil microemulsions** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Gao, D., He, R. R., Carraro, C., Howe, R. T., Yang, P. D., Maboudian, R.
2005; 127 (13): 4574-4575
- **A new nano-electro-mechanical field effect transistor (NEMFET) design for low-power electronics** *IEEE International Electron Devices Meeting*
Kam, H., Lee, D. T., Howe, R. T., King, T. J.
IEEE.2005: 477-480
- **Anchor loss simulation in resonators** *18th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Bindel, D. S., Quevy, E., Koyama, T., Govindjee, S., Demmel, J. W., Howe, R. T.
IEEE.2005: 133-136
- **Silicon nitride-on-silicon bar resonator using internal electrostatic transduction** *13th International Conference on Solid-State Sensors, Actuators and Microsystems*
Bhave, S. A., Howe, R. T.
IEEE.2005: 2139-2142
- **Fully-differential poly-SiC Lamé-mode resonator and checkerboard filter** *18th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*
Bhave, S. A., Gao, D., Maboudian, R., Howe, R. T.
IEEE.2005: 223-226
- **Simulation tools for damping in high frequency resonators** *4th IEEE Conference on Sensors*
Koyama, T., Bindel, D. S., He, W., Quevy, E. P., Govindjee, S., Demmel, J. W., Howe, R. T.
IEEE.2005: 349-352
- **Redundant MEMS resonators for precise reference oscillators** *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*
Quevy, E. P., Howe, R. T.
IEEE.2005: 113-116
- **Microfluidic generation of tunable emulsions for templated monodisperse silica**
Zendejas, F., J., Srinivasan, U., Holtz, W., J., Keasling, J., D., Howe, R., T.
2005
- **Anchor loss simulation in resonators**
Bindel, D., S., Quévy, E., Govinjee, S., Demmel, J., W., Howe, R., T.
2005
- **Silicon nitride-on-silicon bar resonator using internal electrostatic transduction**
Bhave, S., A., Howe, R., T.
2005
- **Selective growth of Si nanowire arrays via galvanic displacement processes in water-in-oil microemulsions** *Journal of the Americal Chemical Society*
Gao, D., He, R., Carraro, C., Howe, R., T., Yang, P., Maboudian, R.
2005; 127: 4574-4575
- **Mechanical elasticity of single and double clamped silicon nanobeams fabricated by the vapor-liquid-solid method** *Applied Physics Letters*
Paulo, A., San, Bokor, J., Howe, R., T., He, R., Yang, P., Gao, D.
2005; 87: 53111-13
- **Fully differential poly-SiC Lamé-mode resonator and checkerboard filter**
Bhave, S., A., Gao, D., Maboudian, R., Howe, R., T.

2005

- **Redundant MEMS resonators for precise reference oscillators**
Quévy, E., P., Howe, R., T.
2005
- **Simulation tools for damping in high frequency resonators**
Koyama, T., Bindel, D., S., He, W., Quévy, E., P., Govindjee, S., Demmel, J., W., Howe, R. T.
2005
- **Thermal budget limits of quarter-micrometer foundry CMOS for post-processing MEMS devices** *IEEE Trans. Electron Devices*
Takeuchi, H., Wun, A., Sun, X., Howe, R., T., King, T., J.
2005; 52: 2081-2086
- **Fracture of polycrystalline 3C-SiC films in microelectromechanical systems** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Gao, D., Carraro, C., Radmilovic, V., Howe, R. T., Maboudian, R.
2004; 13 (6): 972-976
- **Effect of excimer laser annealing on the structural properties of silicon germanium films** *JOURNAL OF MATERIALS RESEARCH*
Sedky, S., Schroeder, J., Sands, T., King, T. J., Howe, R. T.
2004; 19 (12): 3503-3511
- **Recent progress toward a manufacturable polycrystalline SiC surface micromachining technology** *IEEE SENSORS JOURNAL*
Gao, D., Wijesundara, M. B., Carraro, C., Howe, R. T., Maboudian, R.
2004; 4 (4): 441-448
- **Pulsed-laser annealing, a low-thermal-budget technique for eliminating stress gradient in poly-SiGe MEMS structures** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Sedky, S., Howe, R. T., King, T. J.
2004; 13 (4): 669-675
- **Ge-blade damascene process for post-CMOS integration of nano-mechanical resonators** *IEEE ELECTRON DEVICE LETTERS*
Takeuchi, H., Quevy, E., Bhave, S. A., King, T. J., Howe, R. T.
2004; 25 (8): 529-531
- **Single-source chemical vapor deposition of 3C-SiC films in a LPCVD reactor - I. Growth, structure, and chemical characterization** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Wijesundara, M. B., Valente, G., Ashurst, W. R., Howe, R. T., Pisano, A. P., Carraro, C., Maboudian, R.
2004; 151 (3): C210-C214
- **Transformer coupled plasma etching of 3C-SiC films using fluorinated chemistry for microelectromechanical systems applications** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Gao, D., Wijesundara, M. B., Carraro, C., Howe, R. T., Maboudian, R.
2004; 22 (2): 513-518
- **Pulsed Laser Annealing, a Low Thermal Budget Technique for Eliminating Stress Gradient in Poly-SiGe MEMS Structures** *IEEE/ASME J. of Microelectromechanical Systems*
Sedky, S., Howe, R., T., King, T., J.
2004; 13: 669-675
- **Optimization of poly-SiGe deposition processes for modular MEMS integration** *Symposium on Micro- and Nanosystems held at the 2003 MRS Fall Meeting*
Lin, B. C., King, T. J., Howe, R. T.
MATERIALS RESEARCH SOCIETY.2004: 43-48
- **Integrated poly-SiGe nanomechanical resonators for wireless sensor nodes** *Conference on Nanosensing*
Quevy, E. P., King, T. J., Howe, R. T.
SPIE-INT SOC OPTICAL ENGINEERING.2004: 368-377
- **Ashing technique for nano-gap fabrication of electrostatic transducers** *Symposium on Nontraditional Approaches to Patterning held at the 2003 MRS Fall Meeting*
Eyoum, M. A., Quevy, E., Takeuchi, H., King, T. J., Howe, R. T.

MATERIALS RESEARCH SOCIETY.2004: 145-147

- **Coupling of resonant modes in micromechanical vibratory rate gyroscopes** *Nanotechnology Conference and Trade Show (Nanotech 2004)*
Phani, A. S., Seshia, A. A., Palaniapan, M., Howe, R. T., Yasaitis, J.
NANO SCIENCE & TECHNOLOGY INST.2004: 335-338
- **Stress Stability of Poly-SiGe and Various Oxide Films in Humid Environments**
Low, C., W., Bircumshaw, B., L., Dorofeeva, T., Solomon, G., King, T., J., Howe, R., T.
2004
- **Fatigue of Polycrystalline Silicon for Microelectromechanical Systems: Crack Growth and Stability under Resonant Loading Conditions** *Mechanics of Materials*
Muhlstein, C., L., Howe, R., T., Ritchie, R., O.
2004; 36: 13-33
- **Transformer coupled plasma etching of 3C-SiC films using fluorinated chemistry for MEMS applications** *J. Vac. Sci. Tech. B*
Gao, D., Howe, R., T., Maboudian, R.
2004; 22: 513-518
- **Fracture of polycrystalline 3C-SiC films in microelectromechanical systems** *IEEE/ASME J. of Microelectromechanical Systems*
Gao, D., Carraro, C., Radmilovic, V., Howe, R., T., Maboudian, R.
2004; 13: 972-976
- **Effects of boron concentration on Si1-xGex properties for integrated MEMS technology**
Eyoum, M., A. N., Su, Y., R., Bircumshaw, B., L., Kouzimov, D., Takeuchi, H., Howe, R., T.
2004
- **Internal electrostatic transduction for bulk-mode MEMS resonators**
Bhave, S., A., Howe, R., T.
2004
- **Effect of eximer laser annealing on the structural properties of silicon germanium films** *J. Materials Research*
Sedky, S., Schroeder, J., King, T., J., Howe, R., T.
2004; 19: 3503-3511
- **Single-source chemical vapor deposition of 3C-SiC films in a LPCVD reactor, part I: Growth, Structure, and Chemical Characterization** *Journal of the Electrochemical Society*
Wijesundara, M., B. J., Valente, G., Howe, R., T., Pisano, A., P., Carraro, C., Maboudian, R.
2004; 151: 210-214
- **High performance inductors using capillary based fluidic self-assembly** *IEEE/ASME J. of Microelectromechanical Systems*
Scott, K., L., Hirano, T., Yang, H., Singh, H., Howe, R., T., Niknejad, A., M.
2004; 13: 300-309
- **Poly-SiGe high frequency resonators based on lithographic definition of nano-gap lateral transducers**
Quévy, E., P., Bhave, S., A., Takeuchi, H., King, T., J., Howe, R., T.
2004
- **Hydrogen peroxide etching and stability of p-type poly-SiGe films**
Bircumshaw, B., L., Wasilik, M., L., Kim, E., B., Su, Y., R., Takeuchi, H., Low, C., W., Howe, R. T.
2004
- **In-situ doped poly-SiGe LPCVD process using BCl3 for post-CMOS integration of MEMS devices**
Low, C., W., Wasilik, M., L., Takeuchi, H., King, T., J., Howe, R., T.
2004
- **Ge-blade damascene process for post-CMOS integration of nano-mechanical resonators** *IEEE Electron Device Lett.*
Takeuchi, H., Quevy, E., Bhave, S., King, T., J., Howe, R., T.
2004; 25: 529-531
- **Coupling of resonant modes in micromechanical vibratory rate gyroscopes**

-
- Phani, A., S., Seshia, A., A., Palaniapan, M., Howe, R., T.
2004
- **Silicon carbide for enhanced MEMS reliability**
Gao, D., Ashurst, W., R., Carraro, C., Howe, R., T., Maboudian, R.
2004
 - **Recent progress toward a manufacturable polycrystalline SiC surface micromachining technology** *IEEE Sensors Journal*
Gao, D., Wijesundara, M., B. J., Carraro, C., Howe, R., T., Maboudian, R.
2004; 4: 441-448
 - **Microbioreactor arrays with parametric control for high-throughput experimentation** *Biotechnology and Bioengineering*
Maharbiz, M., M., Holtz, W., J., Howe, R., T., Keasling, J., D.
2004; 85: 376-381
 - **Nitrogen doping of polycrystalline 3C-SiC films grown using 1,3-disilabutane in a conventional LPCVD reactor** *JOURNAL OF CRYSTAL GROWTH*
Wijesundara, M. B., Gao, D., Carraro, C., Howe, R. T., Maboudian, R.
2003; 259 (1-2): 18-25
 - **Electrostatic charge and field sensors based on micromechanical resonators** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Riehl, P. S., Scott, K. L., Muller, R. S., Howe, R. T., Yasaitis, J. A.
2003; 12 (5): 577-589
 - **High-selectivity etching of polycrystalline 3C-SiC films using HBr-based transformer coupled plasma** *APPLIED PHYSICS LETTERS*
Gao, D., Howe, R. T., Maboudian, R.
2003; 82 (11): 1742-1744
 - **Electrostatic charge and field sensors based on micromechanical resonators** *IEEE/ASME J. of Microelectromechanical Systems*
Riehl, P., S., Scott, K., L., Muller, R., S., Howe, R., T., Yasaitis, J., A.
2003; 12: 577-589
 - **Model for micropart planarization in capillary-based microassembly** *BOSTON TRANSDUCERS'03: DIGEST OF TECHNICAL PAPERS, VOLS 1 AND 2*
Scott, K. L., Howe, R. T., RADKE, C. J.
2003: 1319-1322
 - **Pulsed laser annealing of silicon-germanium films** *Symposium on Nano- and Microelectromechanical Systems (NEMS and MEMS) and Molecular Machines held at the 2002 MRS Fall Meeting*
Sedky, S., Schroeder, J., Sands, T., Howe, R., King, T. J.
MATERIALS RESEARCH SOCIETY.2003: 61-66
 - **Temporal variation of angular momentum in the convection zone** *Meeting on Local and Global Helioseismology*
Komm, R., Howe, R., Durney, B. R., Hill, F.
ESA PUBLICATIONS DIVISION C/O ESTEC.2003: 97-102
 - **An integrated, vertical-drive, in-plane-sense microgyroscope** *12th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS 03)*
Bhave, S. A., Seeger, J. I., Jiang, X., Boser, B. E., Howe, R. T., Yasaitis, J.
IEEE.2003: 171-174
 - **High modulus polycrystalline 3C-SiC technology for RF MEMS** *12th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS 03)*
Gao, D., Wijesundara, M. B., Carraro, C., Low, C. W., Howe, R. T., Maboudian, R.
IEEE.2003: 1160-1163
 - **The radial bulk annular resonator: Towards a 50 Omega RF MEMS filter** *12th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS 03)*
Bircumshaw, B., Liu, G., Takeuchi, H., King, T. J., Howe, R., O'Reilly, O., Pisano, A.
IEEE.2003: 875-878
 - **Performance comparison of integrated z-axis frame microgyroscopes** *16th IEEE Annual International Conference on Micro Electro Mechanical Systems*
Palaniapan, M., Howe, R. T., Yasaitis, J.
-

IEEE.2003: 482–485

- **A modular process for integrating thick polysilicon MEMS devices with sub-micron CMOS**
Yasaitis, J., Judy, M., Brosnihan, T., Garone, P., Pokrovskiy, N., Sniderman, D., Howe, R. T.
2003
- **High modulus polycrystalline 3C-SiC technology for RF MEMS**
Gao, D., Wijesundara, B., J., Carraro, C., Low, C., W., Howe, R., T., Maboudian, R.
2003
- **Properties of phosphorus-doped poly-SiGe films for MEMS applications** *Journal of the Electrochemical Society*
Jeon, Y., C., King, T., J., Howe, R., T.
2003; 150: H1-H6
- **Model for micropart planarization in capillary-based microassembly**
Scott, K., L., Howe, R., T., Radke, C., J.
2003
- **Integrated Z-axis frame microgyroscope with ISOD design**
Palaniapan, M., Howe, R., T., Yasaitis, J.
2003
- **The radial bulk annular resonator: towards a 50W RF MEMS filter**
Bircumshaw, B., Liu, G., Takeuchi, H., King, T., J., Howe, R., O'Reilly, O.
2003
- **Optimization of poly-SiGe deposition processes for modular MEMS integration**
Lin, B., C. Y., King, T., J., Howe, R., T.
2003
- **Polycrystalline silicon germanium films for integrated microsystems** *IEEE/ASME Journal of Micro-electromechanical Systems*
Franke, A., E., Heck, J., M., King, T., J., Howe, R., T.
2003; 12: 160-171
- **Characterization of residual strain in SiC films deposited using 1,3-disilabutane for MEMS applications** *J. Microlith.*
Gao, D., Wijesundara, M., B. J., Carraro, C., Howe, R., T., Maboudian, R.
2003; 2: 259-264
- **Nitrogen doping of polycrystalline 3C-SiC films using 1,3-disilabutane in a conventional LPCVD reactor** *J. Crystal Growth*
Wijesundara, M., B. J., Gao, D., Carraro, C., Howe, R., T., Maboudian, R.
2003; 259: 18-25
- **An integrated, vertical drive, in-plane-sense microgyroscope**
Bhave, S., A., Seeger, J., I., Jiang, X., Boser, B., E., Howe, R., T., Yasaitis, J.
2003
- **A microfabricated electrochemical oxygen generator for high-density cell culture arrays** *IEEE/ASME J. of Microelectromechanical Systems*
Maharbiz, M., M., Holtz, W., J., Sharifzadeh, S., Keasling, J., D., Howe, R., T.
2003; 12: 590-599
- **High-selectivity etching of polycrystalline 3C-SiC films using HBr-based transformer coupled plasma** *Applied Physics Letters*
Gao, D., Howe, R., T., Maboudian, R.
2003; 82: 1742-1744
- **A vacuum packaged surface micromachined resonant accelerometer** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Seshia, A. A., Palaniapan, M., Roessig, T. A., Howe, R. T., Gooch, R. W., Schimert, T. R., Montague, S.
2002; 11 (6): 784-793
- **Nitrogen doping of polycrystalline 3C-SiC films grown by single-source chemical vapor deposition** *THIN SOLID FILMS*
Wijesundara, M. B., Stoldt, C. R., Carraro, C., Howe, R. T., Maboudian, R.

2002; 419 (1-2): 69-75

- **A low-temperature CVD process for silicon carbide MEMS** *Transducers 2001 Conference/Eurosensor XVth Conference*
Stoldt, C. R., Carraro, C., Ashurst, W. R., Gao, D., Howe, R. T., Maboudian, R.
ELSEVIER SCIENCE SA.2002: 410-415
- **Microsystems Research in Japan** *WTEC, Baltimore, Maryland*
Howe, R., Allen, M., Berlin, A., Hui, E., Monk, D., Najafi, K.
2002
- **Fluidic self-assembly of micromirrors onto microactuators using capillary forces** *IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS*
Srinivasan, U., Helmbrecht, M. A., Rembe, C., Muller, R. S., Howe, R. T.
2002; 8 (1): 4-11
- **Low-temperature LPCVD MEMS technologies** *Symposium on MEMS and BioMEMS held at the 2002 MRS Spring Meeting*
Howe, R. T., King, T. J.
MATERIALS RESEARCH SOCIETY.2002: 205-213
- **Recent progress in modularly integrated MEMS technologies** *IEEE International Electron Devices Meeting*
King, T. J., Howe, R. T., Sedky, S., Liu, G., Lin, B. C., Wasilik, M., Duenn, C.
IEEE.2002: 199-202
- **An integrated microelectromechanical resonant output gyroscope** *15th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2002)*
Seshia, A. A., Howe, R. T., Montague, S.
IEEE.2002: 722-726
- **Integrated surface-micromachined z-axis frame microgyroscope** *IEEE International Electron Devices Meeting*
Palaniapan, M., Howe, R. T., Yasaitis, J.
IEEE.2002: 203-206
- **Fluidic self-assembly of micromirrors onto microactuators using capillary forces (invited)** *IEEE Journal on Selected Topics in Quantum Electronics*
Srinivasan, U., Helmbrecht, M., A., Rembe, C., Muller, R., S., Howe, R., T.
2002; 8: 4-11
- **Capacitive Interface for a Vertically Driven X&Y-Axis Rate Gyroscope**
Jiang, X., Bhave, S., A., Seeger, J., I., Howe, R., T., Boser, B., E., Yasaitis, J.
2002
- **Interconnect issues for integrated MEMS technologies**
King, T., J., Howe, R., T., Eyoum, M., A., Bhave, S., A.
2002
- **A low-temperature CVD process for silicon carbide MEMS** *Sensors and Actuators A*
Stoldt, C., R., Carraro, C., Ashurst, W., R., Gao, D., Howe, R., T., Maboudian, R.
2002; 97-98: 410-415
- **A vacuum packaged surface micromachined resonant accelerometer** *IEEE/ASME Journal of Microelectromechanical Systems*
Seshia, A., A., Palaniapan, M., Roessig, T., A., Howe, R., T., Gooch, R., W., Schimert, T., R.
2002; 11: 784-793
- **Nitrogen doping of 3C-SiC films grown by single-source chemical vapor deposition** *Thin Solid Films*
Wijesundara, M., B. J., Stoldt, C., R., Carraro, C., Howe, R., T., Maboudian, R.
2002; 419: 69-75
- **High-resolution electrometer with micromechanical variable capacitor**
Riehl, P., Scott, K., Muller, R., S., Howe, R., T.
2002
- **Recent progress in modularly integrated MEMS technologies**
King, T., J., Howe, R., T., Sedky, S., Liu, G., Lin, B., C.-Y., Wasilik, M.

2002

- **Low-temperature LPCVD MEMS technologies**

Howe, R., T., King, T., J.

2002

- **Pulsed laser annealing of silicon germanium films**

Sedky, S., Schroeder, J., Sands, T., Howe, R., King, T., J.

2002

- **A microfabricated electrochemical oxygen generator for high-density cell culture arrays**

Maharbiz, M., M., Holtz, W., J., Keasling, J., D., Howe, R., T.

2002

- **Poly-SiGe: a high-Q structural material for integrated RF MEMS**

Bhave, S., A., Bircumshaw, B., L., Kim, Y., S., Low, W., Z., King, T., J., Howe, R., T.

2002

- **Integrated surface-micromachined Z-axis frame microgyroscope**

Palaniapan, M., Howe, R., T., Yasaitis, J.

2002

- **MEMS: Some Self-Assembly Required** *Optics & Photonics News*

Srinivasan, U., King, T., J., Howe, R., T.

2002: 26-30

- **Micromechanical Pierce oscillator for resonator sensor applications**

Seshia, A., A., Low, W., Z., Bhave, S., A., Howe, R., T.

2002

- **An integrated microelectromechanical resonant-output gyroscope**

Seshia, A., A., Howe, R., T., Montague, S.

2002

- **Alkene based monolayer films as anti-stiction coatings for polysilicon MEMS** *Solid-State Sensors and Actuators Workshop*

Ashurst, W. R., Yau, C., Carraro, C., Lee, C., Kluth, G. J., Howe, R. T., Maboudian, R.

ELSEVIER SCIENCE SA.2001: 239-48

- **Integrated MEMS technologies** (*invited*) *MRS Bulletin*

Franke, A., E., King, T., J., Howe, R., T.

2001

- **High-aspect-ratio, molded microstructures with electrical isolation and embedded interconnects** *Microsystem Technologies*

Muller, L., Howe, R., T., Pisano, A., P.

2001; 7: 47-54

- **Modeling of capillary forces and binding sites for fluidic self-assembly**

Böhringer, K., F., Srinivasan, U., Howe, R., T.

2001

- **Full three-dimensional motion characterization of a gimballed electrostatic microactuator**

Rembe, C., Muller, L., Muller, R., S., Pisano, A., P., Howe, R., T.

2001

- **Microstructure to substrate self-assembly using capillary forces** *IEEE/ASME J. of Microelectromechanical Systems*

Srinivasan, U., Liepmann, D., Howe, R., T.

2001; 10: 17-24

- **Microgimbal torsion beam design using open, thin-walled cross sections** *IEEE/ASME J. of Microelectromechanical Systems*

Muller, L., Pisano, A., P., Howe, R., T.

2001; 10: 550-560

- **Alkene based monolayer films as anti-stiction coatings for polysilicon MEMS** *Sensors and Actuators A*
Ashurst, W., R., Yau, C., Carraro, C., Lee, C., Kluth, G., J., Howe, R., T.
2001; 91: 239-248
- **Micromirrors for adaptive optics**
Helmbrecht, M., A., Srinivasan, U., Rembe, C., Howe, R., T., Muller, R., S.
2001
- **Single-step assembly of complex 3-D microstructures**
Hui, E., E., Howe, R., T., Rodgers, M., S.
2000
- **Alkene based monolayer films as anti-stiction coatings for polysilicon MEMS**
Ashurst, W., R., Yao, C., Carraro, C., Howe, R., T., Maboudian, R.
2000
- **Electrical isolation process for molded, high-aspect-ratio polysilicon microstructures**
Muller, L., Heck, J., M., Howe, R., T., Pisano, A., P.
2000
- **Silicon microbial bioreactor arrays**
Maharbiz, M., Howe, R., T., Keasling, J., D.
2000
- **Post-CMOS modular integration of poly-SiGe microstructures using poly-Ge sacrificial layers**
Franke, A., E., Jiao, Y., Wu, M., T., King, T., J., Howe, R., T.
2000
- **Stroboscopic interferometer with variable magnification to measure dynamics in an adaptive-optics micromirror**
Rembe, C., Hart, M., Helmbrecht, M., A., Srinivasan, U., Muller, R., S., Lau, K., Y., Howe, R. T.
2000
- **Fluidic self-assembly of micromirrors onto surface micromachined actuators**
Srinivasan, U., Helmbrecht, M., Rembe, C., Muller, R., S., Howe, R., T.
2000
- **High aspect ratio poly-silicon-germanium microstructures**
Heck, J., M., Keller, C., G., Franke, A., E., Muller, L., King, T., J., Howe, R., T.
1999
- **Batch micropackaging by compression-bonded wafer-wafer transfer** *MEMS '99: TWELFTH IEEE INTERNATIONAL CONFERENCE ON MICRO ELECTRO MECHANICAL SYSTEMS, TECHNICAL DIGEST*
Maharbiz, M. M., Cohn, M. B., Howe, R. T., Horowitz, R., Pisano, A. P.
1999: 482-489
- **Post-CMOS integration of germanium microstructures** *12th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 99)*
Franke, A. E., BILIC, D., Chang, D. T., Jones, P. T., King, T. J., Howe, R. T., Johnson, G. C.
IEEE.1999: 630-637
- **Batch transfer assembly of micro-components onto surface and SOI MEMS**
Maharbiz, M., Howe, R., T., Pister, K., S. J.
1999
- **Integrated resonant accelerometer based on rigidity change**
Tabata, O., Yamamoto, T., Seshia, A., A., Howe, R., T.
1999
- **An integrated CMOS micromechanical resonator high-Q oscillator** *IEEE J. Solid-State Circuits*
Nguyen, C., T.-C., Howe, R., T.

1999; 34: 440-455

- **Batch micropackaging by compression-bonded wafer-wafer transfer**
Maharbiz, M., M., Cohn, M., B., Howe, R., T., Horowitz, R., Pisano, A., P.
1999
- **Vacuum encapsulation of resonant devices using permeable polysilicon**
Leboutz, K., S., Mazaheri, A., Howe, R., T., Pisano, A., P.
1999
- **Modeling and simulation of micromachined gyroscopes in the presence of imperfections**
Shkel, A., M., Howe, R., T., Horowitz, R.
1999
- **Fluidic microassembly using patterned self-assembled monolayers and shape matching**
Srinivasan, U., Howe, R., T., Liepmann, D.
1999
- **Optimization of poly-silicon-germanium as a microstructural material**
Franke, A., E., Bilic, D., Chang, D., T., Jones, P., T., King, T., J., Howe, R., T.
1999
- **Third harmonic double-ended tuning fork resonator**
Bilic, D., Howe, R., T., Clark, W., A., Roessig, T., A.
1999
- **Materials characterization for MEMS - a comparison of uniaxial and bending tests**
Jones, P., T., Johnson, G., C., Howe, R., T.
1999
- **Performance evaluation of batch-transferred surface micromachined resonators**
Singh, A., Bilic, D., Howe, R., T.
1999
- **Statistical characterization of fracture of brittle MEMS materials**
Jones, P., T., Johnson, G., C., Howe, R., T.
1999
- **Post-CMOS integration of germanium microstructures**
Franke, A., E., Bilic, D., Chang, D., T., Jones, P., T., King, T., J., Howe, R., T.
1999
- **Dynamics and control of micromachined gyroscopes**
Shkel, A., M., Horowitz, R., Seshia, A., A., Park, S., Howe, R., T.
1999
- **Mechanical performance of an integrated microgimbal / microactuators for disk drives**
Muller, L., Noworolski, J., M., Howe, R., T., Pisano, A., P.
1999
- **Surface micromachining for microelectromechanical systems** *PROCEEDINGS OF THE IEEE*
Bustillo, J. M., Howe, R. T., Muller, R. S.
1998; 86 (8): 1552-1574
- **Alkyltrichlorosilane-based self-assembled monolayer films for stiction reduction in silicon micromachines** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*
Srinivasan, U., Houston, M. R., Howe, R. T., Maboudian, R.
1998; 7 (2): 252-260
- **Carbonized parylene as a conformal sacrificial layer for high aspect ratio molded polysilicon**
Hui, E., E., Keller, C., G., Howe, R., T.

1998

- **Microassembly technologies for MEMS** *Microfluidic Devices and Systems*
Cohn, M. B., Bohringer, K. F., NOWOROLSKI, J. M., Singh, A., Keller, C. G., Goldberg, K. Y., Howe, R. T.
SPIE-INT SOC OPTICAL ENGINEERING.1998: 2-16
- **Microassembly technologies for MEMS** *SPIE Conference on Micromachining and Microfabrication Process Technology IV*
Cohn, M. B., Bohringer, K. F., NOWOROLSKI, J. M., Singh, A., Keller, C. G., Goldberg, K. Y., Howe, R. T.
SPIE-INT SOC OPTICAL ENGINEERING.1998: 2-16
- **Microassembly technologies for MEMS** *Conference on Microelectronic Structures and MEMS for Optical Processing IV*
Cohn, M. B., Bohringer, K. F., NOWOROLSKI, J. M., Singh, A., Keller, C. G., Goldberg, K. Y., Howe, R. T.
SPIE-INT SOC OPTICAL ENGINEERING.1998: 2-16
- **Microassembly technologies for MEMS** *Micromachined Devices and Components IV*
Cohn, M. B., Bohringer, K. F., NOWOROLSKI, J. M., Singh, A., Keller, C. G., Goldberg, K. Y., Howe, R. T.
SPIE-INT SOC OPTICAL ENGINEERING.1998: 2-16
- **Microassembly technologies for MEMS** *Materials and Device Characterization in Micromachining*
Cohn, M. B., Bohringer, K. F., NOWOROLSKI, J. M., Singh, A., Keller, C. G., Goldberg, K. Y., Howe, R. T.
SPIE - INT SOC OPTICAL ENGINEERING.1998: 2-16
- **Microassembly technologies for MEMS**
Cohn, M., B., Bohringer, K., F., Noworolski, J., M., Singh, A., Keller, C., G., Goldberg, K., Y., Howe, R. T.
1998
- **Fracture strength of polycrystalline silicon**
Jones, P., T., Johnson, G., C., Howe, R., T.
1998
- **Parallel microassembly with electrostatic force fields**
Bohringer, K., F., Goldberg, K., Cohn, M., Howe, R., Pisano, A.
1998
- **Lubrication of polysilicon micromechanisms with self-assembled monolayers**
Srinivasan, U., Foster, J., D., Maboudian, R., Howe, R., T., Senft, D., C., Dugger, M., D.
1998
- **Surface-micromachined 1 MHz oscillator with low-noise Pierce configuration**
Roessig, T., A., Howe, R., T., Pisano, A., P., Smith, J., H.
1998
- **Commercialization of precision inertial sensors with integrated signal conditioning** *Sensors Expo West, San Jose, California*
Juneau, T., N., Lemkin, M., A., Roessig, T., A., Clark, W., A., Howe, R., T., Bustillo, J., M.
1998
- **Alkyltrichlorosilane-based self-assembled monolayer films for stiction reduction** *IEEE/ASME J. of Micro-electromechanical Systems*
Srinivasan, U., Houston, M., R., Howe, R., T., Maboudian, R.
1998; 7: 252-260
- **Surface micromachining for micro-electro-mechanical systems** *Proc. of the IEEE*
Bustillo, J., M., Howe, R., T., Muller, R., S.
1998; 86: 1552-1574
- **Microelectromechanical filters for signal processing** *IEEE/ASME J. of Microelectromechanical Systems*
Lin, L., Howe, R., T., Pisano, A., P.
1998; 7: 286-294
- **Stiction reduction processes for surface micromachines** *TRIBOLOGY LETTERS*
Maboudian, R., Howe, R. T.

1997; 3 (3): 215-221

- **Effect of hydrogen termination on the work of adhesion between rough polycrystalline silicon surfaces** *JOURNAL OF APPLIED PHYSICS*
Houston, M. R., Howe, R. T., Maboudian, R.
1997; 81 (8): 3474-3483
- **Stiction reduction processes for surface micromachines** *Tribology Letters*
Maboudian, R., Howe, R., T.
1997; 3: 215-221
- **Embedded interconnect and electrical isolation for high-aspect-ratio, SOI inertial instruments** *9th International Conference on Solid-State Sensors and Actuators*
Brosnihan, T. J., Bustillo, J. M., Pisano, A. P., Howe, R. T.
IEEE.1997: 637-640
- **Surface-micromachined resonant accelerometer** *9th International Conference on Solid-State Sensors and Actuators*
Roessig, T. A., Howe, R. T., Pisano, A. P., Smith, J. H.
IEEE.1997: 859-862
- **Batch transfer of microstructures using flip-chip solder bump bonding** *9th International Conference on Solid-State Sensors and Actuators*
Singh, A., Horsley, D. A., Cohn, M. B., Pisano, A. P., Howe, R. T.
IEEE.1997: 265-268
- **Self-assembled fluorocarbon films for enhanced stiction reduction** *9th International Conference on Solid-State Sensors and Actuators*
Srinivasan, U., Houston, M. R., Howe, R. T., Maboudian, R.
IEEE.1997: 1399-1402
- **Critical review: Adhesion in surface micromechanical structures** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Maboudian, R., Howe, R. T.
1997; 15 (1): 1-20
- **Nonlinear mixing in surface-micromachined tuning fork oscillators**
Roessig, T., A., Howe, R., T., Pisano, A., P.
1997
- **Effect of hydrogen termination on the work of adhesion between rough polycrystalline silicon surfaces** *J. of Applied Physics*
Houston, M., R., Howe, R., T., Maboudian, R.
1997; 81: 3474-3483
- **Batch transfer of microstructures using flip-chip solder bump bonding**
Singh, A., Horsley, D., A., Cohn, M., B., Pisano, A., P., Howe, R., T.
1997
- **Hexsil tweezers for teleoperated micro-assembly**
Keller, C., G., Howe, R., T.
1997
- **Self-assembled fluorocarbon films for enhanced stiction reduction**
Srinivasan, U., Houston, M., R., Howe, R., T., Maboudian, R.
1997
- **Embedded interconnect and electrical isolation for high-aspect-ratio, SOI inertial instruments**
Brosnihan, T., J., Bustillo, J., M., Pisano, A., P., Howe, R., T.
1997
- **Experiments in micromanipulation and CAD-driven microassembly**
Feddem, J., T., Keller, C., G., Howe, R., T.
1997
- **A micro strain gauge with mechanical amplifier** *IEEE/ASME J. of Microelectromechanical Systems*
Lin, L., Pisano, A., P., Howe, R., T.

1997; 6: 313-321

- **Microelectronics: an Integrated Approach**

Howe, R., T., Sodini, C., G.
Prentice Hall.1997

- **Surface-micromachined resonant accelerometer**

Roessig, T., A., Howe, R., T., Pisano, A., P.
1997

- **Critical review: stiction in surface micromechanical structures** *J. Vacuum Science and Technology B*

Maboudian, R., Howe, R., T.
1997; B15: 1-19

- **Multimode digital control of a suspended polysilicon microstructure** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*

Fedder, G. K., Howe, R. T.
1996; 5 (4): 283-297

- **Polysilicon integrated microsystems: Technologies and applications** *SENSORS AND ACTUATORS A-PHYSICAL*

Howe, R. T., Boser, B. E., Pisano, A. P.
1996; 56 (1-2): 167-177

- **Surface micromachined accelerometers** *IEEE JOURNAL OF SOLID-STATE CIRCUITS*

Boser, B. E., Howe, R. T.
1996; 31 (3): 366-375

- **Surface micromachined accelerometers** *IEEE J. of Solid-State Circuits*

Boser, B., E., Howe, R., T.
1996; 31: 366-375

- **Self-assembled monolayers as permanent anti-stiction coatings for polysilicon microstructures**

Houston, M., R., Maboudian, R., Howe, R., T.
1996

- **Wafer-to-wafer microstructure transfer for vacuum packaging**

Cohn, M., B., Liang, Y., Howe, R., T., Pisano, A., P.
1996

- **Z-axis vibratory rate gyroscope**

Clark, W., A., Howe, R., T., Horowitz, R.
1996

- **Design, fabrication, position sensing, and control of an electrostatically driven polysilicon microactuator** *IEEE Trans. on Magnetics*

Cheung, P., Horowitz, R., Howe, R., T.
1996; 32: 122-128

- **Polysilicon integrated microsystems: technologies and applications** *(invited) Sensors and Actuators A*

Howe, R., T., Boser, B., E., Pisano, A., P.
1996; 56: 167-177

- **Multi-mode digital control of suspended polysilicon microstructures** *IEEE/ASME J. of Microelectromechanical Systems*

Fedder, G., K., Howe, R., T.
1996; 5: 283-297

- **Micromechanical structures for fracture testing of brittle thin films**

Jones, P., T., Johnson, G., C., Howe, R., T.
1996

- **Hexsil tweezers with polysilicon piezoresistive strain gauges** *Late News Digest, 7th Solid-State Sensor and Actuator Workshop, Hilton Head Island, S. C.*

Keller, C., G., Howe, R., T.

1996: 31-32

- **Surface micromachined Z-axis vibratory rate gyroscope**
Clark, W., A., Howe, R., T., Horowitz, R.
1996
- **Young's Modulus of in-situ Phosphorus-Doped Polysilicon**
Biebl, M., Brandl, G., Howe, R., T.
1995
- **Surface micromachined accelerometers** *IEEE 1995 Custom Integrated Circuits Conference*
Boser, B. E., Howe, R. T.
IEEE.1995: 337-344
- **Diamond-like carbon films for silicon passivation in microelectromechanical devices** *Symposium on Mechanical Behavior of Diamond and Other Forms of Carbon*
Houston, M. R., Howe, R. T., Komvopoulos, K., Maboudian, R.
MATERIALS RESEARCH SOC.1995: 391-402
- **Permeable Polysilicon Microshell Etch-Access Windows**
Leboutz, K., S., Howe, R., T., Pisano, A., P.
1995
- **Self-assembly of microsystems using non-contact electrostatic traps**
Cohn, M., B., Howe, R., T., Pisano, A., P.
1995
- **High aspect ratio molded CVD silicon MEMS**
Keller, C., G., Howe, R., T.
1995
- **Diamond-like carbon for silicon passivation in micromechanical devices**
Houston, M., R., Howe, R., T., Komvopoulos, K., Maboudian, R.
1995
- **In Situ Phosphorus Doped Polysilicon for Integrated MEMS**
Biebl, M., Mulhern, G., T., Howe, R., T.
1995
- **Ammonium Fluoride Surface Treatments for Reducing In-Use Stiction in Polysilicon Microstructures**
Houston, M., R., Howe, R., T., Maboudian, R.
1995
- **Polysilicon Integrated Microsystems: Technologies and Applications**
Howe, R., T.
1995
- **Surface micromachined resonant force sensors**
Roessig, T., A., Pisano, A., P., Howe, R., T.
1995
- **Surface micromachined angular accelerometer with force feedback**
Brosnihan, T., J., Pisano, A., P., Howe, R., T.
1995
- **Surface Micromachining: from Vision to Reality to Vision**
Payne, R., S., Sherman, S., Lewis, S., Howe, R., T.
edited by Drory, M., D., Bogy, D., B., Donley, M., S.
1995

- **Recent Advances in Surface Micromachining**
Howe, R., T.
1995
- **Hexsil bimorphs for vertical actuation**
Keller, C., G., Howe, R., T.
1995
- **An integrated force-balanced capacitive accelerometer for low-G applications**
Chau, K., H.-L., Lewis, S., R., Zhao, Y., Howe, R., T., Bart, S., F., Marcheselli, R., G.
1995
- **Surface Micromachined Accelerometers**
Boser, B., E., Howe, R., T.
1995
- **Nickel-filled thermally actuated hexsil tweezers**
Keller, C., G., Howe, R., T.
1995
- **Silicon Micromachining for Resonator Fabrication**
Howe, R., T.
1994
- **Silicon Surface Treatments for Stiction Reduction in Silicon Micromachining : A Surface Science Approach**
Houston, M., R., Maboudian, R., Howe, R., T.
1994
- **Silicon dioxide sacrificial layer hydrofluoric acid etching: Part II -- modeling** *J. of the Electrochemical Society*
Monk, D., J., Soane, D., S., Howe, R., T.
1994; 141: 271-274
- **Silicon dioxide sacrificial layer hydrofluoric acid etching: Part I - experimental observations** *J. of the Electrochemical Society*
Monk, D., J., Soane, D., S., Howe, R., T.
1994; 141: 264-269
- **Integrated Testbed for Multi-Mode Digital Control of Suspended Microstructures**
Fedder, G., K., Howe, R., T.
1994
- **Design and Performance of CMOS Micromechanical Resonator Oscillators**
Nguyen, C., T.-C., Howe, R., T.
1994
- **Polysilicon Integrated Mechatronics: Applications and Recent Developments**
Howe, R., T.
1994
- **Polysilicon microresonators for signal processing**
Nguyen, C., T.-C., Howe, R., T.
1994
- **Viscous damping model for laterally oscillating microstructures** *IEEE/ASME J. of Microelectromechanical Systems*
Cho, Y., H., Kwak, B., M., Pisano, A., P., Howe, R., T.
1994; 3: 81-87
- **Process Technology for the Modular Integration of CMOS and Microstructures** *(invited) Microsystem Technology*
Bustillo, J., M., Fedder, G., K., Nguyen, C., T.-C., Howe, R., T.
1994; 1: 30-41

- **Micromechanical Resonators for Frequency References and Signal Processing**
Howe, R., T., Nguyen, C., T.-C.
1994
- **Slide film damping in laterally driven microstructures** *Sensors and Actuators A*
Cho, Y., H., Kwak, B., M., Pisano, A., P., Howe, R., T.
1994; 40: 31-39
- **Self-assembled monolayer film for enhanced imaging of rough surfaces with atomic force microscopy** *J. of Applied Physics*
Alley, R., L., Komvopoulos, K., Howe, R., T.
1994; 76: 5731-5737
- **S-D Modulator interfacing with silicon microsensors** *Sensors*
Yun, W., Howe, R., T.
1993: 11-18
- **A PASSIVE, INSITU MICRO STRAIN-GAUGE** *1993 IEEE WORKSHOP ON MICRO ELECTRO MECHANICAL SYSTEMS (MEMS 93)*
Lin, L. W., Howe, R. T., Pisano, A. P.
I E E E.1993: 201-206
- **POLYSILICON HOLLOW BEAM LATERAL RESONATORS** *1993 IEEE WORKSHOP ON MICRO ELECTRO MECHANICAL SYSTEMS (MEMS 93)*
JUDY, M. W., Howe, R. T.
I E E E.1993: 265-271
- **VISCOUS ENERGY-DISSIPATION IN LATERALLY OSCILLATING PLANAR MICROSTRUCTURES - A THEORETICAL AND EXPERIMENTAL-STUDY** *1993 IEEE WORKSHOP ON MICRO ELECTRO MECHANICAL SYSTEMS (MEMS 93)*
Cho, Y. H., Kwak, B. M., Pisano, A. P., Howe, R. T.
I E E E.1993: 93-98
- **STRESS-CORROSION CRACKING AND BLISTERING OF THIN POLYCRYSTALLINE SILICON FILMS IN HYDROFLUORIC-ACID** *Symposium on Thin Films: Stresses and Mechanical Properties IV, at the 1993 Spring Meeting of the Materials-Research-Society*
Monk, D. J., Krulevitch, P., Howe, R. T., Johnson, G. C.
MATERIALS RESEARCH SOC.1993: 641-646
- **Vacuum encapsulated lateral microresonators**
Lin, L., McNair, K., M., Howe, R., T., Pisano, A., P.
1993
- **Sigma-Delta modulator interfacing with microsensors** *Sensors Expo West, San Jose, California*
Yun, W., Howe, R., T.
1993: 159-164
- **Determination of the etching kinetics for the hydrofluoric acid/silicon dioxide system** *J. of the Electrochemical Society*
Monk, D., J., Soane, D., S., Howe, R., T.
1993; 140: 2339-2346
- **A novel micro in situ strain gauge**
Lin, L., Howe, R., T., Pisano, A., P.
1993
- **CMOS Micromechanical Resonator Oscillator**
Nguyen, C., T.-C., Howe, R., T.
1993
- **Polysilicon hollow beam lateral resonators**
Judy, M., W., Howe, R., T.
1993
- **Stress-corrosion cracking and blistering of thin polycrystalline silicon films in hydrofluoric acid**
Monk, D., J., Krulevitch, P., Howe, R., T., Johnson, G., C.

1993

- **Microresonator frequency control using an integrated micro oven**
Nguyen, C., T., Howe, R., T.
1993
- **A Chemical Reaction Mechanism and Kinetics for Hydrofluoric Acid Etching of Silicon Dioxide Thin Films** (*invited review*) *Thin Solid Films*
Monk, D., J., Soane, D., S., Howe, R., T.
1993; 232 (1): 1-12
- **Supercritical carbon dioxide drying of microstructures**
Mulhern, G., T., Soane, D., S., Howe, R., T.
1993
- **Highly compliant lateral suspensions using sidewall beams**
Judy, M., W., Howe, R., T.
1993
- **Surface roughness modification of interfacial contacts in polysilicon microstructures**
Alley, R., L., Mai, P., Komvopoulos, K., Howe, R., T.
1993
- **Viscous energy dissipation in laterally oscillating planar microstructures: a theoretical and experimental study**
Cho, Y., H., Kwak, B., M., Pisano, A., P., Howe, R., T.
1993
- **Enhanced removal of sacrificial layers for silicon surface micromachining**
Monk, D., J., Soane, D., S., Howe, R., T.
1993
- **Characterization of thin films using micromechanical structures**
Pratt, R., I., Johnson, G., C., Howe, R., T., Nikkel Jr., D., J.
1992
- **MICRO ELECTROMECHANICAL FILTERS FOR SIGNAL-PROCESSING** *5TH WORKSHOP ON MICRO ELECTRO MECHANICAL SYSTEMS (MEMS 92)*
Lin, L. W., Nguyen, C. T., Howe, R. T., Pisano, A. P.
I E E E.1992: 226-231
- **Stress and microstructure in phosphorus doped polycrystalline silicon**
Krulevitch, P., Johnson, G., C., Howe, R., T.
1992
- **Electrostatic comb drive levitation and control method** *IEEE/ASME Journal of Microelectromechanical Systems*
Tang, W., C., Lim, M., G., Howe, R., T.
1992; 1 (4): 170-178
- **Surface micromachined, digitally force-balanced accelerometer with integrated CMOS detection circuitry**
Yun, W., Howe, R., T., Gray, P., R.
1992
- **Thermal microassembly of narrow-gap electrostatic comb-drive structures**
Fedder, G., K., Chang, J., C., Howe, R., T.
1992
- **Micro Electromechanical Filters**
Lin, L., Nguyen, C., T.-C., Howe, R., T., Pisano, A., P.
1992
- **Silicon microfabricated accelerometers: a perspective on recent developments** (*invited paper*), *Sensors Expo, Chicago, Ill.*
Yun, W., Howe, R., T., Gabriel, K., J., Trimmer, W., S. N.

1992: 204A-1 - 204A-8.

- **Recent developments in silicon microaccelerometers** *Sensors*
Yun, W., Howe, R., T.
1992: 31-41
- **The effect of release-etch processing on surface microstructure stiction**
Alley, R., L., Howe, R., T., Komvopoulos, K.
1992
- **Quality factor control for micromechanical resonators**
Nguyen, C., T.-C., Howe, R., T.
1992
- **Stress and microstructure in LPCVD polysilicon films: experimental results and closed form modeling of stresses**
Krulevitch, P., Johnson, G., C., Howe, R., T.
1992
- **Sacrificial layer etching model for surface micromachining applications**
Monk, D., J., Soane, D., S., Howe, R., T.
1992
- **Sacrificial layer SiO₂ wet etching for micromachining applications**
Monk, D., J., Soane, D., S., Howe, R., T.
1992
- **Sacrificial Silicon Dioxide Wet Etching for Micromachining Applications**
Monk, D., J., Soane, D., S., Howe, R., T.
1991
- **SELF-ADJUSTING MICROSTRUCTURES (SAMS) 4TH IEEE WORKSHOP ON MICRO MECHANICAL SYSTEMS (MEMS 91)**
JUDY, M. W., Cho, Y. H., Howe, R. T., Pisano, A. P.
I E E E.1991: 51-56
- **THERMAL ASSEMBLY OF POLYSILICON MICROSTRUCTURES 4TH IEEE WORKSHOP ON MICRO MECHANICAL SYSTEMS (MEMS 91)**
Fedder, G. K., Howe, R. T.
I E E E.1991: 63-68
- **Stress in Undoped LPCVD Polycrystalline Silicon**
Krulevitch, P., Johnson, G., C., Howe, R., T.
1991
- **Ultrasonically Induced Microtransport**
Moroney, R., M., White, R., M., Howe, R., T.
1991
- **Design and Modeling of a Linear Microactuator**
Cheung, P., Horowitz, R., Howe, R.
1991
- **LPCVD Polysilicon Thin Films: The Evolution of Structure, Texture, and Stress**
Krulevitch, P., A., Nguyen, T., D., Johnson, G., C., Howe, R., T., Wenk, H., R., Gronsky, R.
1991
- **Modeling and Position-Detection of a Polysilicon Linear Microactuator**
Cheung, P., Horowitz, R., Howe, R.
1991
- **Ultrasonically Induced Microtransport with Cylindrical Geometry**
Moroney, R., M., White, R., M., Howe, R., T.

1991

- **Micromechanical Structures for Thin Film Characterization**

Pratt, R., I., Johnson, G., C., Howe, R., T.

1991

- **Self-Adjusting Microstructures**

Judy, M., W., Cho, Y., H., Howe, R., T., Pisano, A., P.

1991

- **ELECTROSTATIC-COMB DRIVE OF LATERAL POLYSILICON RESONATORS** *5TH INTERNATIONAL CONF ON SOLID-STATE SENSORS AND ACTUATORS AND EUROSENSORS 3 (TRANSDUCERS 89)*

Tang, W. C., NGUYEN, T. C., JUDY, M. W., Howe, R. T.

ELSEVIER SCIENCE SA.1990: 328-31

- **Fluid Motion Produced by Ultrasonic Lamb waves**

Moroney, R., M., White, R., M., Howe, R., T.

1990

- **Resonant-Bridge Two-Axis Microaccelerometer** *Sensors and Actuators*

Chang, S., C., Putty, M., W., Hicks, D., B., Li, C., H., Howe, R., T.

1990; A21-A23: 342-345

- **Electrostatically Balanced Comb Drive for Controlled Levitation**

Tang, W., C., Lim, M., G., Howe, R., T.

1990

- **A Planar Air-Levitated Electrostatic Actuator System**

Pister, K., S. J., Fearing, R., S., Howe, R., T.

1990

- **Polysilicon Microstructures to Characterize Static Friction**

Lim, M., G., Chang, J., Schultz, D., P., Howe, R., T., White, R., M.

1990

- **Spiral Microstructures for the Measurement of Average Strain Gradients in Thin Films**

Fan, L., S., Yun, W., Muller, R., S., Howe, R., T., Huang, J.

1990

- **missing title** *J. of Applied Physics*

Wenk, H., R., Sintubin, M., Huang, J., Johnson, G., C., Howe, R., T.

1990; 67: 572-574

- **Fabrication Technologies for Integrated Microdynamic Systems** (*invited paper*), *Integrated Micro-Motion Systems Micromachining, Control and Applications*

Yun, W., Tang, W., C., Howe, R., T.

edited by Harashima, F.

Amsterdam: Elsevier Science Publishers.1990: 297-312

- **Silicon micromechanics: sensors and actuators on a chip** *IEEE Spectrum*

Howe, R., T., Muller, R., S., Gabriel, K., J., Trimmer, W., S. N.

1990: 29-35

- **Electrostatic-Comb Drive of Lateral Polysilicon Resonators** *Sensors and Actuators A*

Tang, W., C., Nguyen, T., C. H., Judy, M., W., Howe, R., T.

1990; A21-A23: 328-331

- **Ultrasonic Micromotors: Physics and Applications**

Moroney, R., M., White, R., M., Howe, R., T.

1990

- **Investigation of texture and stress in undoped polysilicon films**
Huang, J., Krulevitch, P., Johnson, G., C., Howe, R., T., Wenk, H., R.
edited by Kamins, T., Thompson, C., V., Raicu, B.
1990
- **Fracture-Toughness Characterization of Brittle Thin Films** *Sensors and Actuators*
Fan, L., S., Howe, R., T., Muller, R., S.
1990; A21-A23: 872-874
- **Microsensors for heat transfer and fluid flow measurements** *Experimental Thermal and Fluid Science*
Udell, K., S., Pisano, A., P., Howe, R., T., White, R., M., Muller, R., S.
1990; 3: 52-59
- **Technologies for microdynamic devices** *Nanotechnology*
Muller, R., S., Howe, R., T.
1990; 1: 8-12
- **Lamb-Wave Interactions with the Chemical, Biological and Physical Environment**
White, R., M., Wenzel, S., W., Martin, B., A., Moroney, R., M., Costello, B., J., Straub, M., A., Howe, R. T.
1990
- **Texture of Undoped LPCVD Polycrystalline Silicon Films**
Huang, J., Lin, K., K., Lau, J., Hodges, D., A., Spanos, C., Johnson, G., C., Howe, R. T.
1989
- **Microstructures for Fracture Toughness Characterization of Brittle Thin Films**
Fan, L., S., Howe, R., T., Muller, R., S.
1989
- **Laterally Driven Polysilicon Resonant Microstructures**
Tang, W., C., Nguyen, T., C. H., Howe, R., T.
1989
- **Ultrasonic micromotor**
Moroney, R., M., White, R., M., Howe, R., T.
1989
- **Electrostatic-Comb Drive of Lateral Polysilicon Resonators**
Tang, W., C., Nguyen, T., C. H., Howe, R., T.
1989
- **Fracture-Toughness Characterization of Brittle Thin Films**
Fan, L., S., Howe, R., T., Muller, R., S.
1989
- **Resonant-Bridge Two-Axis Microaccelerometer**
Chang, S., C., Putty, M., W., Hicks, D., B., Li, C., H., Howe, R., T.
1989
- **Vacuum-insulated field-effect transistor** *Electronics Letters*
Huang, J., Howe, R., T., Lee, H., S.
1989; 25: 1571-1573
- **Microsensor and microactuator applications of thin films** *Thin Solid Films*
Howe, R., T.
1989; 181: 235-243
- **One-Port Active Polysilicon Resonant Microstructures**
Putty, M., W., Chang, S., C., Howe, R., T., Robinson, A., L., Wise, K., D.
1989

- **Microsensor and Microactuator Applications of Thin Films**
Howe, R., T.
1989
- **Laterally driven polysilicon resonant microstructures** *Sensors and Actuators*
Tang, W., C., Nguyen, T., C. H., Howe, R., T.
1989; 20: 25-32
- **Silicon Microdynamic Systems: Recent Developments in Microactuators and Micromachinery** (*invited paper*), *IEEE WESCON, San Francisco, California*
Howe, R., T.
1989: 202-204
- **Process integration for active polysilicon resonant microstructures** *Sensors and Actuators*
Putty, M., W., Chang, S., C., Howe, R., T., Robinson, A., L., Wise, K., D.
1989; 20: 143-151
- **A digital readout technique for capacitive sensor applications** *IEEE J. of Solid-State Circuits*
Kung, J., T., Lee, H., S., Howe, R., T.
1988; 23: 972-977
- **Surface Micromachining Processes for Electrostatic Motor Fabrication**
Lober, T., A., Howe, R., T.
1988
- **Surface Micromachining for Microsensors and Microactuators**
Howe, R., T.
1988
- **Design considerations for microfabricated electric actuators** *Sensors and Actuators*
Bart, S., F., Lober, T., A., Lang, J., H., Howe, R., T., Schlecht, M., F.
1988; 14: 269-292
- **A Thermally Isolated Microstructure Suitable for Gas Sensing Applications**
Huff, M., A., Senturia, S., D., Howe, R., T.
1988
- **Microsensors for heat transfer and fluid flow measurements**
Udell, K., S., Pisano, A., P., Howe, R., T., White, R., M., Muller, R., S.
1988
- **Design and calibration of a microfabricated floating-element shear-stress sensor** *IEEE Trans. on Electron Devices*
Schmidt, M., A., Howe, R., T., Senturia, S., D., Haritonidis, J., H.
1988; 35: 750-757
- **Surface micromachining for microsensors and microactuators** *J. of Vacuum Science and Technology, Part B*
Howe, R., T.
1988; 6: 1809-1813
- **Microfabricated structures for the in-situ measurement of residual stress, Young's modulus, and ultimate strain in polyimide films** *Applied Physics Letters*
Allen, M., G., Mehregany, M., Howe, R., T., Senturia, S., D.
1987; 51: 241-243
- **Silicon resonant microsensors**
Schmidt, M., A., Howe, R., T.
1987
- **Resonant microsensors**
Howe, R., T.
1987

- **Surface micromachining of polyimide/metal composites for a shear-stress sensor**
Schmidt, M., A., Howe, R., T., Senturia, S., D., Haritonidis, J., H.
1987
- **Novel microstructures for the in-situ measurement of mechanical properties of thin films** *J. of Applied Physics*
Mehregany, M., Howe, R., T., Senturia, S., D.
1987; 62: 3579-3584
- **Fabrication and testing of a micromachined shear sensor**
Schmidt, M., A., Howe, R., T., Senturia, S., D., Haritonidis, J., H.
1987
- **A micromachined floating-element shear sensor**
Schmidt, M., A., Howe, R., T., Senturia, S., D., Haritonidis, J., H.
1987
- **Applications of polysilicon films in microsensors and microactuators**
Howe, R., T.
1987
- **Electric micromotors: electromechanical characteristics**
Lang, J., H., Schlecht, M., F., Howe, R., T.
1987
- **Polycrystalline silicon micromachining: a new technology for integrated sensors** *Annals of Biomedical Engineering*
Howe, R., T.
1986; 14: 187-197
- **Resonant-microbridge vapor sensor** *IEEE Trans. on Electron Devices*
Howe, R., T., Muller, R., S.
1986; ED-33: 499-506
- **Resonant structures for integrated sensors**
Schmidt, M., A., Howe, R., T.
1986
- **Polycrystalline silicon microstructures** (*invited*), *Micromachining and Micropackaging of Transducers*
Howe, R., T.
edited by Fung, C., F., Cheung, P., W., Ko, W., H.
Amsterdam: Elsevier Science Publishers.1985: 169–187
- **Polysilicon bridges for anemometer applications**
Tai, Y., C., Muller, R., S., Howe, R., T.
1985
- **Frequency response of polycrystalline silicon microbridges**
Howe, R., T., Muller, R., S.
edited by Fung, C., F., Cheung, P., W., Ko, W., H.
1985
- **Resonant polysilicon microbridge with integrated NMOS detection circuitry**
Howe, R., T., Muller, R., S.
1984
- **Integrated resonant-microbridge vapor sensor**
Howe, R., T., Muller, R., S.
1984
- **Polycrystalline and amorphous silicon micromechanical beams: annealing and mechanical properties** *Sensors and Actuators*
Howe, R., T., Muller, R., S.

1983; 4: 447-454

- **Polycrystalline silicon micromechanical beams** *J. of the Electrochemical Society*
Howe, R., T., Muller, R., S.
1983; 130: 1420-1423
- **Polycrystalline Silicon Micromechanical Beams**
Howe, R., T., Muller, R., S.
1982
- **Epitaxial silicon microshell vacuum-encapsulated CMOS-compatible 200 MHz bulk-mode resonator**
Chen, K. L., Chandralalim, H., Graham, A., B., Bhave, S., A., Howe, R., T., Kenny, T., W.
- **Fully differential interal electrostatic transduction of a Lamé-mode resonator**
Ziaei-Moayyed, M., Elata, D., Hsieh, J., Chen, J., W., Quévy, E., P., Howe, R., T.
- **Photonic crystal mirrors for free-space communication and fiber-optic sensors**
Hadzialic, S., Jung, I., W., Kilic, O., Kim, S., Provine, J., Howe, R., T.
- **Wafer scale encapsulation of large lateral deflection MEMS structures**
Graham, A., B., Messana, M., Hartwell, P., Provine, J., Yoneoka, S., Kim, B., Howe, R. T.