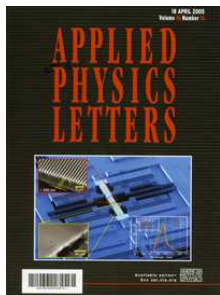


KURABAYASHI GROUP

Publications



Manuscripts in Archival Journals

2010

Predicting the stochastic guiding of kinesin-driven microtubules in microfabricated tracks: A statistical-mechanics-based modeling approach
C.T Lin, E. Meyhofer, and K. Kurabayashi
Phys. Rev. E., **81**, 011919 (2010).

Microfabricated Thermal Modulator for Comprehensive Two-Dimensional Micro Gas Chromatography: Design, Thermal Modeling, and Preliminary Testing
S.-J. Kim, S.M. Reidy, B. Block, K.D. Wise, E.T. Zellers, and K. Kurabayashi
Lab Chip, **10**, 1647-1654 (2010) (**a cover image article**).

2009

High-speed tuning of visible laser wavelength using a nanoimprinted grating optical tunable filter
N.-T. Huang, S.C. Truxal, Y.-C. Tung, A. Hsiao, S. Takayama, and K. Kurabayashi
Appl. Phys. Lett., **95**, 211106 (2009).

Surface Landing of Microtubule Nanotracks Influenced by Lithographically Patterned Channels
C.T. Lin, M.T. Kao, E. Meyhofer, and K. Kurabayashi
Appl. Phys. Lett., **95**, 103701 (2009).

Temperature-Programmed Natural Convection for Micromixing and Biochemical Reaction in a Single Microfluidic Chamber
S.J. Kim, F. Wang, M.A. Burns, and K. Kurabayashi
Analytical Chemistry, **81**, 4510-4516 (2009).

Robust Design of RF-MEMS Cantilever Switches Using Contact Physics Modeling
M.M. Shalaby, Z. Wang, L.L.W. Chow, B.D. Jensen, J.L. Volakis, K. Kurabayashi, and K. Saitou
IEEE Trans. Industrial Electronics, **56**(4), 1012-1021 (2009).

2008

High-Speed Deformation Soft Lithographic Nano Grating Patterns for Ultrasensitive Optical Spectroscopy
S.C. Truxal, Y.-C. Tung, and K. Kurabayashi
Appl. Phys. Lett., **92**, 05116 (2008) (also published in *Virtual Journal of Nanoscale Science and Technology*, vol. 17, no. 8, 2008.)

Laser micro-machining using near-field optics
H. Chung, K. Kurabayashi, and S. Das
Appl. Surf. Sci., **254**, 5105-5110 (2008).

A Flexible Nanograting Integrated Onto Silicon Micromachines by Soft Lithographic Replica Molding and Assembly

S.C. Truxal, Y.-C. Tung, and K. Kurabayashi

J. Microelectromechanical Systems., **17**, 393-401 (2008).

Design of a MEMS Tunable Polymer Grating for Single Detector Spectroscopy

S.C. Truxal, K. Kurabayashi, and T.-C. Tung

Int. J. Optomechatronics, **2**, 75-87 (2008).

Electrically Programmable Surfaces for Reconfigurable Cell Patterning

C.T. Fan, Y.-C. Tung, S. Takayama, E. Meyhofer, and K. Kurabayashi

Advanced Materials, **20**, 1418-1423 (2008).

Self-contained biomolecular motor-driven protein sorting and concentrating in an ultrasensitive microfluidic chip

C.-T. Lin, M.-T. Kao, K. Kurabayashi, and E. Meyhofer

Nano Lett., **8**, 1041-1046 (2008).

2007

Fabrication of Beam Structures with Micro-Scale Cross-Sections and Meso-Scale Spans

M.J. Martin, R.D. White, R.D., K. Kurabayashi, and I.D. Boyd.

J. Micromech. and Microeng., **17**, 2516-2521 (2007).

An efficient preconditioner (LESP) for hybrid matrices arising in RF MEMS switch analysis

Z. Wang, J.L. Volakis, K. Kurabayashi, and K. Saitou

Applied Computational Electromagnetics Soc. J., **22**, 327-332 (2007).

Lifetime Extension of RF MEMS Direct Contact Switches by Ball-Grid-Array (BGA) Dimple Design

L.L.W Chow, K. Saitou, J.L. Volakis, and K. Kurabayashi

IEEE Electron Device Lett. **28**, 479-481 (2007).

2006

Protein Pattern Assembly by Actively Controlling a Triblock Copolymer Monolayer

C.Y. Fan, K. Kurabayashi, and E. Meyhofer

Nano Lett., **6**, 2763-2767 (2006).

Skin-effect Self-heating in Air Suspended RF MEMS Transmission-line Structures

L.L.W. Chow, Z. Wang, B.D. Jensen, K. Saitou, J.L. Volakis, and K. Kurabayashi

J. Microelectromechanical Systems, **15**, 1622-1631 (2006).

Transition from multiple to single microcontact conduction during hot switching of microelectromechanical switches with ball-shaped dimples

L.L.W Chow, S.A. Schrader, and K. Kurabayashi

Appl. Phys. Lett., **89**, 133501 (2006) (also published in *Virtual Journal of Nanoscale Science and Technology*, vol. 14, no. 15, 2006).

Efficient Designs for Powering Microscale Devices with Nanoscale Biomolecular Motors

C.-T Lin, M.-T. Kao, K. Kurabayashi, and E. Meyhofer,

Small, **2**, 281-287 (2006).

Full-Wave Electromagnetic and Thermal Modeling for Prediction of Heat-Dissipation-Induced RF MEMS Switch Failure

Z. Wang, B. Jensen, L.L.-W Chow, J. Volakis, K. Saitou, and K. Kurabayashi

Journal of Micromechanics and Microengineering, **16**, 157-164 (2006).

2005

Effect of Nanoscale Heating on Electrical Transport in RF MEMS Switch Contacts

B.D. Jensen, L. L.-W Chow, K. Huang, K. Saitou, J.L. Volakis, and K. Kurabayashi
J. Microelectromechanical Systems, **14**, 935- 946 (2005).

“Nanoimprinted Strain-Controlled Elastomeric Gratings for Optical Wavelength Tuning
Y.-C. Tung and K. Kurabayashi
Appl. Phys. Lett., **86**, 161113 (2005). (**a cover image article**) (also published in *Virtual Journal of Nanoscale Science and Technology*, vol. 11, no. 16, 2005)

A Metal-Coated Polymer Micromirror for Strain-Driven High-Speed Multi-Axis Optical Scanning
Y.-C. Tung and K. Kurabayashi
IEEE Photonics Tech. Lett., **17**, 1193-1195 (2005).

Adhesion Effects on Contact Opening Dynamics in Micromachined Switches
B.D. Jensen, K. Huwang, L.L.-W. Chow, and K. Kurabayashi
J. Appl. Phys., **97**, 103535 (2005).

A Single-Layer PDMS-on-Silicon Hybrid Micro Actuator with Multi-Axis Out-of-Plane Motion Capabilities: Part I: Modeling and Design
Y.-C. Tung and K. Kurabayashi
J. Microelectromechanical Systems., **14**, 548- 557 (2005).

A Single-Layer PDMS-on-Silicon Hybrid Micro Actuator with Multi-Axis Out-of-Plane Motion Capabilities: Part II: Fabrication and Characterization
Y.-C Tung and K. Kurabayashi
J. Microelectromechanical Systems., **14**, 558- 566 (2005).

Low-Force Contact Heating and Softening using Micromechanical Switches in Diffusive-Ballistic Electron Transport Transition
B.D. Jensen, L.L.W. Chow, K. Huwang, and K. Kurabayashi
Appl. Phys. Lett. **86**, 023507 (2005) (also published in *Virtual Journal of Nanoscale Science and Technology*, vol. 11, no. 2, 2005).

2004

PDMS-based opto-fluidic micro flow cytometer with two-color, multi-angle fluorescence detection capability using PIN photodiodes
Y.-C. Tung, M. Zhang, C.-T. Lin, K. Kurabayashi, and S.J. Skerlos
Sensors and Actuators B, **98**(2-3), 356-367 (2004).

2003

Comparison of semi-analytical formulations and Gaussian-quadrature rules for quasi-static double-surface potential integrals
Z. Wang, J. Volakis, K. Saitou, and K. Kurabayashi
IEEE Antenna and Propagation Magazine, **45**(6), 96-102 (2003).

Reversible Switching of High-Speed Air-Liquid Two-Phase Flows Using Electrowetting-Assisted Flow-Pattern Change
D. Huh, A.H. Tkaczky, J.H. Bahng, Y. Chang, H.-H. Wei, J.B. Grotberg, C.-J. Kim, K. Kurabayashi, and S. Takayama, *J. Am. Chem. Soc.* **125**(48), 14678-14679 (2003).

Fully Integrated Electrothermal Multi-Domain Modeling of RF MEMS Switches
B.D. Jensen, K. Saitou, J.L. Volakis, and K. Kurabayashi
IEEE Microwave and Wireless Components Letters, **13**(9), 364-366 (2003).

Anisotropic Thermal Energy Transport in Polarized Liquid Crystalline (LC) Polymers under Electric Fields
K. Kurabayashi and H. Khalkhali
Microscale Thermophysical Engineering, **7**(2), 87-99 (2003).

Shaped Comb Fingers for Compensation of Mechanical Restoring Force in Tunable Resonators
B.D. Jensen, S. Mutlu, S. Miller, K. Kurabayashi, and J.J. Allen
J. Microelectromechanical Systems, **12**(3), 373-383, (2003).

2002

Thermal Conduction in Doped Single-Crystal Silicon Films
M. Asheghi, K. Kurabayashi, R. Kasnavi, K.E. and Goodson
J. Appl. Phys., **91**(8), 5079-5088 (2002).

Air-Liquid Two-Phase Microfluidic System for Low-Cost, Low-Volume, and Low-Power Micro Flow Cytometer
D. Huh, Y.-C. Tung, J.B. Grotberg, S. Skerlos, K. Kurabayashi, and S. Takayama,
Biomedical Microdevices, **4**(2), 141-149 (2002).

2001

Anisotropic Thermal Properties of Solid Polymers
K. Kurabayashi
Int. J. Thermophysics, **22**(1), 277-288 (2001).

Temperature Dependent Thermal Conductivity of Undoped Polycrystalline Silicon Layers
U. Srinivasan, A.D. McConnell, M. Asheghi, K. Kurabayashi, and K.E. Goodson
Int. J. Thermophysics, **22**(2), 650-616 (2001).

1999

Impact of Molecular Orientation on Heat Transport in Linear-Chain Polymer Thin Films
K. Kurabayashi and K.E. Goodson
J. Appl. Phys, **86**, 1925-1931 (1999).

Measurement of the Thermal Conductivity Anisotropy in Polyimide Films
K. Kurabayashi, M. Asheghi, M. Touzelbaev, and K.E. Goodson
J. Microelectromechanical Systems, **8**, 180-191 (1999).

Measurement of Anisotropic Thermal Conductivity of Thin Dielectric Films using Harmonic Joule Heating
Y.S Ju, K. Kurabayashi, and K.E. Goodson
Thin Solid Films, **339**, 160-164 (1999).

1998

Precision Measurement and Mapping of Die-Attach Thermal Resistance
K. Kurabayashi and K.E. Goodson
IEEE Transactions on Components, Packaging, and Manufacturing Technology, Part A, **21**, 506-514, (1998).

Picosecond Differential Transmission Measurements Using Joule Heating and Optical Thermometry
Y.S. Ju, K. Kurabayashi, and K.E. Goodson
Microscale Thermophysical Engineering, **2**, 101-110 (1998).

1997

Improved Heat Sinking for Laser-Diode Arrays using Microchannels in CVD Diamond
K.E. Goodson, K. Kurabayashi, and R.F.W. Pease
IEEE Transactions on Components, Packaging, and Manufacturing Technology, Part B: Advanced Packaging, **20**, 104-109 (1997).

Manuscript in Refereed Conference and Symposium Proceedings

2010

Understanding and Control of Unstable Contact Resistance in RF MEMS gold-gold direct contact switches
L.L.W. Chow and K. Kurabayashi

Proc. the 23rd International Conference on Micro Electro Mechanical System, MEMS 2010, Hong Kong, pp. 771-774, January 24-28 (2010).

A low power, high-speed miniaturized thermal modulator for comprehensive 2D gas chromatography
S.-J., Kim, S.M. Reidy, B.P. Block, K.D. Wise, E.T. Zellers, and K. Kurabayashi
Proc. the 23rd International Conference on Micro Electro Mechanical System, MEMS 2010, Hong Kong, pp. 124-127, January 24-28 (2010).

2009

A Nano Grating Tunable MEMS Optical Filter for High-Speed On-Chip Multispectral Fluorescent Detection
S.C. Truxal, N.T. Huang and K. Kurabayashi
Proc. the 31st Annual International Conference of IEEE Engineering in Medicine and Biology Society, Minneapolis, MN, pp. 6693-6695, September 2-6 (2009).

Co-Design of a MEMS Actuator and Its Controller Using Frequency Constraint
D.L. Peters K. Kurabayashi, P.Y. Papalambros, and A.G. Ulsoy
Proc. of the 1st Annual ASME Dynamic Systems and Control Conference, Ann Arbor, MI, pp. 423-429 (2009).

2007

Statistical Models for Biomolecular Shuttles Gliding in Microfabricated Open Channels
C.-T. Lin, E. Meyhofer, and K. Kurabayashi
Proc. the 11th International Symposium on Micro Total Analysis Systems (μ TAS), Paris, France, pp. 1012-1015, October 7-11 (2007).

A PDMS-on-Silicon Deformable Grating for Spectral Differentiation of Mixed Wavelength Signals
S.C. Truxal, Y.-C. Tung, and K. Kurabayashi
Proc. Transducers '07, vol. 1, pp. 1087-1090, Lyon, France, June 10-14 (2007).

Mechanically Tunable Photonic Crystal
S. Schrader, S.C. Truxal, and K. Kurabayashi
Proc. ISOT 2007 International Symposium on Optomechatronic Technologies, Lausanne, Switzerland, vol. 6717, No. C7170, October 8-10 (2007).

MEMS Tunable Polymer Grating for Advantageous Spectroscopic Measurements
S.C. Truxal, Y.-C. Tung, and K. Kurabayashi
Proc. ISOT 2007 International Symposium on Optomechatronic Technologies, Lausanne, Switzerland, vol. 6715, No. 67150F, October 8-10 (2007).

2006

A Single-Layer Multiple Degree-of-Freedom PDMS-on-Silicon Dynamic Focus Micro-lens
Y.-C. Tung and K. Kurabayashi
Proc. the 19th IEEE Micro Electro Mechanical Systems, Istanbul, Turkey, pp. 838-841, Jan. 22 – 26 (2006).

2005

Skin Effect Aggregated Heating in RF MEMS Suspended Structures
L.L.-W. Chow, Z. Wang, B.D. Jensen, K. Saitou, J.L. Volakis, and K. Kurabayashi
Proc. 2005 IEEE MTT-S International Microwave Symposium, Long Beach, CA, pp. 2143-2146, June 11-17 (2005).

Multi-Scale Soft-Lithographic Lift-Off and Grafting (MS-SLLOG) Process for Active Polymer Nanophotonic Device Fabrication
Y.-C., Tung, S.C. Truxal, and K. Kurabayashi
Proceedings of SPIE International Symposium on Optomechatronic Technologies (ISOT), Sapporo, Japan, vol. 6050, No. 605002, December 5-7 (2005)

A Nanoimprinted Strain-Induced Reconfigurable Polymer Micro-Optical Grating
Y.-C. Tung and K. Kurabayashi

Proc. 18th IEEE Micro Electro Mechanical Systems, Miami Beach, FL, pp. 243-246, Jan. 30 – Feb.3 (2005).

2004

Multi-axis single-layer PDMS-on-silicon micro optical reflector

Y.-C. Tung, and K. Kurabayashi

Proc. SPIE Optomechatronic Micro/Nano Components, Devices, and Systems (Y. Katagiri Ed.), vol. 5604, pp. 126-135, , 2004. (**Best Student Paper Award**)

Electrically Tunable, Reprogrammable Protein Patterning Using Fluorocarbon Polymer-Coated Electrode Patterns

A. Frost, C.-T. Lin, E. Meyhofer, and K. Kurabayashi

Proc. the 8th International Symposium on Micro Total Analysis Systems (μ TAS), Malmo, Sweden, pp. 112-114, Sept. 26-30 (2004).

A preconditioner for hybrid matrices arising in RF MEMS switch analysis

Z. Wang, B. Jensen, L. Chow, J. Volakis, K. Saitou, and K. Kurabayashi

Proc. 2004 IEEE Antenna and Propagation Society International Symposium, Monterey, CA, Ontario, vol. 3, pp.2847-2850, June 20-25 (2004).

Asperity Heating for Repair of Metal Contact RF MEMS Switches

B.D. Jensen, K. Huwang, L. Chow, K. Saitou, J.L. Volakis, and K. Kurabayashi

Proc. IEEE International Microwave Symposium, MTT-S, Fort Worth, Texas, pp. 1939-1942, June 6-11, (2004).

Micromachined thermosyphon for on-chip cooling of high-power INPHBT circuits

H. Khalkhali and K. Kurabayashi

Proc. IThERM 2004, Las Vegas, NV, vol. 2, pp. 736-737, June 1-4 (2004).

Force Dependence of RF MEMS Switch Contact Heating

B.D. Jensen, L.W. Chow, R.F. Webbink, K. Saitou, J.L. Volakis, and K. Kurabayashi

Proc. the 17th IEEE International Conference on Micro Electro Mechanical Systems, Maastricht, The Netherlands, pp. 137-140, Jan. 25-29 (2004).

2003

Integrated electrothermal modeling of RF MEMS switches for improved power handling capability

B.D. Jensen, Z. Wang, L. Chow, K. Saitou, K. Kurabayashi, and J.L. Volakis

Proc. 2003 IEEE Topical Conference on Wireless Communication Technology, Honolulu, HI, pp. 10-11, October 15-17 (2003).

Biomolecular Motors as Novel Prime Movers for Micro-TAS: Microfabrication and Materials Issues

T.S. Kim, H.K. Nanjundaswamy, C.-T. Lin, S. Lakamper, L.J. Cheng, D. Hoff, E.F. Hasselbrink, L.J. Guo, K. Kurabayashi, A.J. Hunt, and E. Meyhofer

Proc. the 7th International Symposium on Micro Total Analysis Systems (μ TAS), vol. 1, pp. 33-36, Squaw Valley, CA, Oct. 5-9 (2003).

Fluidic Switching of High-Speed Air-Liquid Two-Phase Flows Using Electrowetting-on-Dielectric

A.H. Tkaczyk, D. Huh, J.H. Bahng, Y. Chang, H.H. WSei, K. Kurabayashi, J.B. Grothberg, C.J. Kim, and S. Takayama

Proc. the 7th International Symposium on Micro Total Analysis Systems (μ TAS), Squaw Valley, CA, vol. 1, pp. 461-464, Oct. 5-9 (2003).

Analysis of RF-MEMS switches using finite element-boundary integration with moment method

Z. Wang, B. Jensen, J. Volakis, K. Saitou, and K. Kurabayashi

Proc. IEEE International Symposium on Antenna and Propagation Society, vol. 2, pp. 173-176, June 22-27 (2003).

Impact of Skin Effect on Thermal behavior of RF MEMS Switches

B.D. Jensen, K. Saitou, J.L. Volakis, and K. Kurabayashi
Proc. 6th ASME-JSME Thermal Engineering Joint Conference, Kohala Coast, Hawaii, March 16-20 (2003).

2002

High Fidelity and Low Cost Detection of Multi-Color Fluorescence from Biological Cells in a Micro Integrated Flow Cytometer (MIFC) with Disposable Observation Cell

Y.-C. Tung, C.-T. Lin, K. Kurabayashi, and S.J. Skerlos

Proc. the 6th International Symposium on Micro Total Analysis Systems (μ TAS), Nara, Japan, Nov., 3-7 (2002).

A computational model of a novel biomolecular microfluidics pump

J.L. Bull, A.J. Hunt, E.F. Hasselbrink, L.J. Guo, K. Kurabayashi, and E. Meyhofer

Proc. the 24th Annual Conference of the IEEE Biomedical Engineering Society, Joint EMBS/BMES Conference, Houston, TX, vol. 3, pp. 1826-1827, October 23-26 (2002).

Polymer micro-heat-pipe for InP/InGaAs technologies

W.Y. Liu, S. Mohammadi, L.P.B. Katehi, H. Khalkhali, and K. Kurabayashi

Proc. The 1^{0th} International Symposium on Electron Devices for Microwave and Optoelectronic Applications, Univ. Manchester Inst. Sci. & Technol., Manchester, England, pp. 143 – 148, Nov. 18-19 (2002).

2001

Air-Liquid Two-Phase Microfluidic System for Low-Cost, Low-Volume, and Low-Power Micro Flow Cytometer

D. Huh, Y.-C. Tung, J.B. Grotberg, S. Skerlos, K. Kurabayashi, and S. Takayama

Proc. the 5th International Symposium on Micro Total Analysis Systems (μ TAS), pp. 468 – 470, Monterey, CA, October 21-25 (2001).

Force/Displacement Multiplication Micromechanism for MEMS

M. Parkinson, B.D. Jensen, and K. Kurabayashi

Proc. the ASME Design Automation Conference, Pittsburgh, PA, Sept. 10-12 (2001).

Measurement of Lift and Drag on MEMS Scale Airfoils in Slip Flow

M. Martin, K. Kurabayashi, and I.D. Boyd

Proc. the ASME Fluids Engineering Division Summer Meeting, New Orleans, Louisiana, May 29 – June 1 (2001).

Patents

1. B.D. Jensen, M. Farina, and K. Kurabayashi, "High-Performance Fully-Compliant Micro-Mechanisms for Force/Displacement Amplification," U.S. Patent #6,748,818, June 2004.
2. K. Kurabayashi, Y.-C. Tung, C.-T. Lin, S. Takayama, and S.J. Skelos, "Flow Cytometers and Detection System of Lesser Size," U.S. Patent #7,105,366, September 2006.
3. C.A. Frost, C.-T. Lin, C.Y. Fund, E. Meyhofer, and K. Kurabayashi, "Reconfigurable Protein Patterning Using Electrowetting Microelectrode Array," U.S. Patent # 7,615,369, July 2009.
4. Chow, L.L.K, and Kurabayashi, K., "Ball-Grid-Array Dimple Design and Fabrication for Lifetime Extension and Power Handling Enhancement of RF MEMS Switches," U.S. Patent (Pending), No. 60/894,938, Filed in March 2007.
5. Wang, T.D., Kurabayashi, K., Oldham, and K. Qiu, Z., "Targeted Dual Axes Confocal Imaging Apparatus with Vertical Scanning Capabilities," U.S. Provisional Patent Filed in November 2009.