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CONTACT INFORMATION	Department of Mechanical Engineering University of California, Santa Barbara Santa Barbara, CA 93106-5100 USA	<i>E-mail:</i> <a href="mailto:bdp@piorek.net">bdp@piorek.net</a> <i>Web:</i> <a href="http://www.piorek.net">http://www.piorek.net</a>
RESEARCH INTERESTS	Microfluidics, numerical simulation, chemical/physical and multiphase transport processes, MEMS physics design, chemical analysis system design, micro/nanoscale reactor design, surface chemistry, DNA chemistry, electrochemistry, cell-free systems	
PUBLICATIONS	<p>Reza Salemmilani, Brian D. Piorek, Rustin Yavar Mirsafavi, Augustus W. Fountain, Martin Moskovits, and Carl D. Meinhart, "Dielectrophoretic Nanoparticle Aggregation for on-demand SERS Analysis". <i>Anal. Chem.</i> (2018).</p> <p>Brian D. Piorek, Chrysafis Andreou, Martin Moskovits, Carl D. Meinhart, "Discrete Free-Surface Millifluidics for Rapid Capture and Analysis of Airborne Molecules Using Surface-Enhanced Raman Spectroscopy". <i>Anal. Chem.</i> (2014) <b>88</b> 2 1061-1066.</p> <p>Brian D. Piorek, Seung Joon Lee, Martin Moskovits, Carl D. Meinhart, "Free-Surface Microfluidics/Surface-Enhanced Raman Spectroscopy for Real-Time Trace Vapor Detection of Explosives". <i>Anal. Chem.</i> (2012) <b>84</b> 22 9700-9705.</p> <p>Changsong Ding, Gaurav Soni, Payam Bozorgi, Brian D. Piorek, Carl D. Meinhart, Noel C. MacDonald, "A Flat Heat Pipe Architecture Based on Nanostructured Titania". <i>J. MEMS</i> (2010) <b>99</b> 1-7.</p> <p>Seung Joon Lee, Brian D. Piorek, Carl D. Meinhart and Martin Moskovits, "Photoreduction at a Distance: Facile, Nonlocal Photoreduction of Ag Ions in Solution by Plasmon-Mediated Photoemitted Electrons". <i>Nano Lett.</i> (2010) <b>10</b> 4 1329-1334.</p> <p>Brian D. Piorek, Seung Joon Lee, Juan G. Santiago, Martin Moskovits, Sanjoy Banerjee and Carl D. Meinhart, "Free-surface microfluidic control of surface-enhanced Raman spectroscopy for the optimized detection of airborne molecules". <i>Proc. Natl. Acad. Sci. USA</i> (2007) <b>104</b> 48 18898-18901.</p> <p>Patrick E. Freudenthal, Matt Pommer, Carl D. Meinhart and Brian D. Piorek, "Quantum nanospheres for sub-micron particle image velocimetry". <i>Exp. Fluids</i> (2007) <b>43</b> 525-533.</p> <p>Brian Piorek, Adam Mechler, Ratnesh Lal, Patrick Freudenthal, Carl Meinhart and Sanjoy Banerjee, "Nanoscale resolution microchannel flow velocimetry by atomic force microscopy". <i>Appl. Phys. Lett.</i> (2006) <b>89</b> 153123-153125.</p> <p>Yi Xiao, Brian D. Piorek, Kevin W. Plaxco and Alan J. Heeger, "A Reagentless Signal-On Architecture for Electronic, Aptamer-Based Sensors via Target-Induced Strand Displacement". <i>J. Am. Chem. Soc.</i> (2005) <b>127</b> 51 17990-17991.</p> <p>Adam Mechler, Brian Piorek, Ratnesh Lal and Sanjoy Banerjee, "Nanoscale velocity-drag force relationship in thin liquid layers measured by atomic force microscopy". <i>Appl. Phys. Lett.</i> (2004) <b>85</b> 17 3881-3883.</p>	

CONFERENCE  
PRESENTATIONS

Brian D. Piorek\*, Chrysafis Andreou, Seung Joon Lee, Martin Moskovits, Carl Meinhart, "Free-surface digital microfluidic systems for optimized SERS analysis in gas chromatography". *63rd Annual Meeting of the American Physical Society, Division of Fluid Dynamics* **55** 16, November 22, 2010.

Brian Piorek\*, Carl Meinhart, Seung Joon Lee, Sanjoy Banerjee and Martin Moskovits, "Free Surface Microfluidics for Explosives Detection". *XXII International Congress of Theoretical and Applied Mechanics*, August 28, 2008.

Brian Piorek\*, Seung Joon Lee, Juan Santiago, Martin Moskovits, Sanjoy Banerjee and Carl Meinhart, "Detection of Gas-Phase Species by a Microfluidic SERS Apparatus". *2006 Annual Meeting, American Institute of Chemical Engineers*, November 13, 2006.

SELECTED  
CONFERENCE  
PAPERS

Brian D. Piorek, Seung Joon Lee, Nick Judy, Carl D. Meinhart, Martin Moskovits, Augustus Fountain, Steven Christesen, and Jason Guicheteau, "Free surface microfluidic/SERS for detection of gas-phase DNT". *Proc. SPIE*, Vol. 7665, 76650L (2010)

Changsong Ding, Gaurav Soni, Payam Bozorgi, Brian Piorek, Carl D. Meinhart, and Noel C. MacDonald, "A Titanium Based Flat Heat Pipe". *Proceedings of IMECE2008*, #IMECE2008-68967, ASME International Mechanical Engineering Congress and Exposition, October 31–November 6, 2008, Boston, MA, USA.

Ira Leifer, Brian Piorek, Walter Smith and Sanjoy Banerjee, "Large-Scale Turbulence Generation and Microbreaking Waves". *Third International Symposium on Turbulence and Shear Flow Phenomena*, 2003, Sendai, Japan.

PROFESSIONAL  
EXPERIENCE

**Chief Technology Officer**  
*Numerical Design, Inc.*

**December 2013 to Present**

**Chief Scientist and Invited Board Participant**  
*SpectraFluidics, Inc.*

**July 2011 to June 2013**

**Vice President of Research and Development**  
*SpectraFluidics, Inc.*

**April 2009 to July 2011**

**Vice President of Engineering**  
*SpectraFluidics, Inc.*

**November 2008 to April 2009**

**Technical Consultant**  
*Gas Reaction Technologies, Inc.*

**July 2004 to September 2013**

ACADEMIC  
RESEARCH  
EXPERIENCE

**University of California, Santa Barbara, Santa Barbara, California USA**

**Project Scientist**  
*American Institute for  
Manufacturing Integrated Photonics*

**June 2015 to Present**

- Working with Prof. Carl Meinhart and Prof. Martin Moskovits
- Research and development of photonic nanoscale devices with integrated microfluidic systems for chemical and biomolecular processing and chemical detection applications

**Visiting Research Scientist**  
*Institute for Collaborative Biotechnologies*

**August 2013 to May 2015**

- Working with Prof. Carl Meinhart and Prof. Martin Moskovits
- Fundamental research towards multiphase micro/nanoscale chemical and biomolecular processes and chemical detection

***Project Scientist***

*Institute for Collaborative Biotechnologies* **November 2009 to November 2010**

- Worked with Prof. Carl Meinhart and Prof. Martin Moskovits
- Fundamental research towards multiphase micro/nanoscale chemical and biomolecular processes and chemical detection

***Graduate Student Researcher***

*Department of Mechanical Engineering* **September 2004 to December 2008**

- Committee: Profs. Carl D. Meinhart (Mech. Eng.), Sanjoy Banerjee (Chem. Eng.), Martin Moskovits (Chem./Biochem.), Tom Soh (Mech. Eng.)
- Co-invented and investigated Free Surface Microfluidics
- Developed MEMS-based detector of vapors emanated from explosive compounds and narcotics at room temperature and co-founded the startup company SpectraFluidics, Inc. to commercialize the technology

***Postgraduate Researcher***

*Department of Chemical Engineering* **July 2002 to September 2004**

- Worked with Profs. Sanjoy Banerjee (Chem. Eng.), Stu Feinstein (MCDB), Les Wilson (MCDB)
- Investigated fluid shear stresses with nanoscale resolution using Atomic Force Microscopy (AFM)
- Investigated microtubule dynamics using AFM and microfluidic cell-free systems

***Undergraduate Researcher***

*Department of Chemical Engineering* **September 2000 to July 2002**

- Worked with Prof. Sanjoy Banerjee
- Investigated microbreaking phenomena in macro-scale open channel flows
  - Designed gas/liquid transport experiments and experimental equipment
  - Conducted gas/liquid transport experiments and analyzed data
  - Designed and implemented custom PIV analysis software

EDUCATION

**University of California, Santa Barbara, Santa Barbara, California USA**

Ph.D., Mechanical Engineering, December 2008

- Advisor: Prof. Carl D. Meinhart
- Thesis Topic: Transport Processes in Free Surface Microfluidics
- Area of Study: MEMS, Fluid Dynamics, Chemistry/Biochemistry, Design of chemical detection systems

B.S., Chemical Engineering, June 2002

- Advisor: Prof. Sanjoy Banerjee
- Completed specialty track in Materials Science
- Completed specialty track in Mathematics and Process Control

SCIENTIFIC  
IMPACT

- 10+ peer-reviewed publications in the fields of microfluidics and chemical detection
- Citations: >500
- h-index: 8

PATENTS

- 10+ patents in the fields of microfluidics and chemical detection

AWARDS - Awarded *Best Ph.D. Dissertation Award, 2008-2009* by department faculty  
- Undergraduate Scholarships  
    Robert Medley Memorial Chemistry Department Scholarship  
    Major William C. Carr Engineering Memorial Scholarship

CLEARANCES U.S. Dept. of Justice Clearance #9CA01884: Transport, ship, receive or possess explo-  
ISSUED sive materials

CITIZENSHIP USA

PERSONAL Ph.D. Advisor: Prof. Carl D. Meinhart (meinhart@engineering.ucsb.edu)  
REFERENCES *Additional references available upon request*