
CONTACT INFORMATION	Department of Mechanical Engineering University of California, Santa Barbara Santa Barbara, CA 93106-5100 USA	<i>E-mail:</i> bdp@piorek.net <i>Web:</i> http://www.piorek.net
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>John S. Cognetti, Daniel J. Steiner, Minhaz Abedin, Michael R. Bryan, Conor Shanahan, Natalya Tokranova, Ethan Young, Alanna M. Klose, Alexander Zavriyev, Nicholas Judy, Brian Piorek, Carl Meinhart, Raymond Jakubowicz, Harold Warren, Nathaniel C. Cady, and Benjamin L. Miller, “Disposable photonics for cost-effective clinical bioassays: application to COVID-19 antibody testing”. <i>Lab on a Chip</i> (2021). <i>Awarded: Lab on a Chip HOT Articles 2021</i></p> <p>Martin Moskovits and Brian D. Piorek, “A brief history of surface-enhanced Raman spectroscopy and the localized surface plasmon”. <i>J. Raman Spectroscopy</i> (2020). <i>Awarded: J. Raman Spectroscopy Hot Paper 2020</i></p> <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>Analytical Chemistry</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>Analytical Chemistry</i> (2014) 88 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>Analytical Chemistry</i> (2012) 84 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) 99 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 Letters</i> (2010) 10 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) 104 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) 43 525-533.</p>	

Brian Piorek, Adam Mechler, Ratnesh Lal, Patrick Freudenthal, Carl Meinhart and Sanjoy Banerjee, "Nanoscale resolution microchannel flow velocimetry by atomic force microscopy". *Appl. Phys. Lett.* (2006) **89** 153123-153125.

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". *J. Am. Chem. Soc.* (2005) **127** 51 17990-17991.

Adam Mechler, Brian Piorek, Ratnesh Lal and Sanjoy Banerjee, "Nanoscale velocity-drag force relationship in thin liquid layers measured by atomic force microscopy". *Appl. Phys. Lett.* (2004) **85** 17 3881-3883.

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

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	<p>University of California, Santa Barbara, Santa Barbara, California USA</p> <p>Ph.D., Mechanical Engineering, December 2008</p> <ul style="list-style-type: none"> • 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 <p>B.S., Chemical Engineering, June 2002</p> <ul style="list-style-type: none"> • Advisor: Prof. Sanjoy Banerjee • Completed specialty track in Materials Science • Completed specialty track in Mathematics and Process Control
SCIENTIFIC IMPACT	<ul style="list-style-type: none"> - 12 peer-reviewed publications in the fields of microfluidics and chemical detection - Citations: More than 500 - h-index: 10
PATENTS	<ul style="list-style-type: none"> - More than 10 issued patents in the fields of microfluidics and chemical detection
AWARDS	<ul style="list-style-type: none"> - Awarded <i>Best Ph.D. Dissertation Award, 2008-2009</i> by department faculty - Undergraduate Scholarships <ul style="list-style-type: none"> Robert Medley Memorial Chemistry Department Scholarship Major William C. Carr Engineering Memorial Scholarship
CLEARANCES ISSUED	<p>U.S. Dept. of Justice Clearance #9CA01884: Transport, ship, receive or possess explosive materials</p>
CITIZENSHIP	<p>USA</p>