

JUAN G. SANTIAGO

Department of Mechanical Engineering, Stanford University, Stanford, CA 94305-3030, Tel. 650-723-5689, Fax 650-723-7657, juan.santiago@stanford.edu, <http://microfluidics.stanford.edu>

Professional Preparation and Employment Record

<i>Institution</i>	<i>Major</i>	<i>Degree & Year</i>	<i>(GPA)</i>
University of Florida at Gainesville,	Mechanical Engineering,	B.S., 5/90	(3.95/4.0)
University of Illinois at Urbana-Champaign,	Mechanical Engineering,	M.S., 8/92	(4.0/4.0)
University of Illinois at Urbana-Champaign,	Mechanical Engineering,	Ph.D., 8/95	(4.0/4.0)

Appointments

2005-Present	Associate Professor, Department of Mechanical Engineering, Stanford University
1998-2005	Assistant Professor, Department of Mechanical Engineering, Stanford University
1997-1998	Research Scientist, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign
1995-1997	Senior Member of Technical Staff, The Aerospace Corporation, El Segundo, CA
1990-1995	Research Assistant, University of Illinois at Urbana-Champaign

Selected Publications

Directly Related to Proposal

Pennathur, S. and Santiago, J.G. "Electrokinetic transport in nanochannels: 1. Theory," Vol. 77, No. 21, *Analytical Chemistry*, pp. 6772-6781, 2005.

Pennathur, S. and Santiago, J.G. "Electrokinetic transport in nanochannels: 1. Experiments," Vol. 77, No. 21, *Analytical Chemistry*, pp. 6782-6789, 2005.

Hertzog, D.E., X. Michalet, M. Jager, X. Kong, J. Santiago, S. Weiss, and O. Bakajin, "Femtomole Mixer for Microsecond Kinetic Studies of Protein Folding," *Analytical Chem.*, Vol. 76, No. 24, 2004.

Oddy, M. and J.G. Santiago, "Alternating Electric Field Measurements of Particle Zeta-Potentials in a Microchannel," Vol. 269, No. 1, *Journal of Colloid and Interface Science*, pp. 192-204, 2004.

Devasenathipathy, S., J.G. Santiago, and K. Takehara, " Particle Tracking Techniques for Electrokinetic Microchannel Flows," Vol. 74, No. 15, pp. 3704-3713, *Analytical Chemistry*, 2002.

Herr, A.E., J.I. Molho, K.A. Drouvalakis, J.C. Mikkelsen, P.J. Utz, J.G. Santiago, and T.W. Kenny, "On-Chip Coupling of Isoelectric Focusing and Free Solution Electrophoresis for Multi-Dimensional Separations," vol. 75, no. 5, *Analytical Chemistry*, pp.1180-1187, 2003.

Jung, B., R. Bharadwaj, and J.G. Santiago, "Thousand-Fold Signal Increase using Field Amplified Sample Stacking for On-Chip Electrophoresis," *Electrophoresis*, Vol. 24, No. 19-20, pp. 3476-3483, 2003

Other Publications in the Field of Electrokinetics and Microfluidic Bioanalytical Systems

Oddy, M.H., and J.G. Santiago, "A Multi-Species Model for Electrokinetic Instability," in press, *Physics of Fluids*, 2005.

Santiago, J.G., "Electroosmotic Flows in Microchannels with Finite Inertial and Pressure Forces," *Analytical Chemistry*, Vol. 73, No. 10, 2001.

Lin, H., Storey, B., M. Oddy, Chen, C.-H., and J.G. Santiago, "Instability of Electrokinetic Microchannel Flows with Conductivity Gradients," Vol. 16, No. 6 *Physics of Fluids*, p.1922-1935, 2004.

Synergistic Activities

- In collaboration with Prof. Carl Meinhardt of Univ. California at Santa Barbara, developed (and patented) micron-resolution particle image velocimetry (μ PIV) for microfluidics. This method has

been shown to achieve the highest spatial measurement resolution for internal fluid flows; has been described in seven journal articles; and is quickly being adopted by researchers in academia, government labs, and industry.

- Completed three invited book review chapters describing high-resolution microfluidic flow diagnostics, flow diagnostics applicable to electrokinetic microsystems, and a general introduction to the research of liquid flows in microchannels (both pressure-driven and electroosmotic flows).
- In collaboration with Prof. Bijan Mohammadi of Montpellier University in France, developed a design methodology for both geometric and temporal control of electrokinetic flows. This method (described in three journal papers so far) uses numerical methods to solve inverse boundary value problems associated with the optimization of electrokinetic flow parameters including electrophoretic sample band shape and dispersion dynamics.
- Developed an innovative style of teaching for three classes at Stanford that combines multimedia content and web-based tools with traditional methods to provide screen-projected and *animated* notes that introduce students to the models taught in the course, displays movies of experiments, presents mathematical derivations, and presents real-time data acquisition. Animations allow for step-by-step presentation of equations using Powerpoint, Applets, and Matlab software. Developed detailed 400 pages of workbooks/note packets with typed and proofread notes (including diagrams and equations).
- Demonstrated exemplary service and effectiveness in recruiting and mentoring women and minorities in engineering by serving as ASME MEMS Sub-Division Chair of Minority Recruitment ('98-Present), working in several ways with Stanford's Office of Engineering Diversity Programs, and actively participating in the Foundation for a College Education (FCE). FCE is a non-profit organization dedicated to promoting access to college by students in traditionally underrepresented groups (including talented African American, Latino, Asian American, and Native American students from lower-socioeconomic backgrounds and who are first in their family to attend college).

Collaborators and Other Affiliations

Collaborators

Goodson, Kenneth, Associate Professor, Stanford University

Kenny, Thomas, Associate Professor, Stanford University

Meinhart, Carl, Associate Professor, University of California, Santa Barbara

Mohammadi, Bijan, Professor, Montpellier, France

Wereley, Steven, Assistant Professor, Purdue University

Utz, Paul J., Assistant Professor, Stanford University

Graduate and Postdoctoral Advisors

Peters, James, Professor, University of Illinois at Urbana-Champaign (M.S. Degree Advisor)

Dutton, J. Craig, Professor, University of Illinois at Urbana-Champaign (Ph.D. Degree Advisor)

Adrian, Ronald J., Professor, University of Illinois at Urbana-Champaign (Postdoctoral Advisor)

Thesis Advisor or Postgraduate-Scholar Sponsor () For The Following:*

Rajiv Bharadwaj, Cullen Buie, Tarun Khurana, Shankar Devasenathipathy, David Hertzog, David Huber, Luis Garcia, Byoungsok Jung, Sumita Pennathur, Klint Rose, Shuhuai Yao, Jonathan Posner,* and Hao Lin.*