

Presenters at the Science Afternoon at NIST:
From Invention to Marketplace
May 12, 2011

Dr. Gregory A. Cooksey, Research Chemist

(http://www.nist.gov/mml/biochemical/cell_systems/gregory_a_cooksey.cfm)

My interests lie in developing microfluidics systems that enable real-time imaging and control of the microenvironments of single cells and groups of cells in high-throughput experiments. Important aspects of this work involve creating macro-to-micro interfaces, designing schemes to deliver and manipulate multiple fluid flows inside microchambers, and developing image analysis tools for real-time system feedback and quantitative measurements within regions of interest. Currently, we are conducting experiments in a high-throughput microfluidic toxicity platform for timelapse observation of 128-culture chambers (see photo): multiple chemical (toxin) gradients and different biomarkers are multiplexed for a total of 128 unique exposure conditions.

Education:

Ph.D. Bioengineering, University of Washington, 2005. Thesis title: "Engineering cells for migration: varying cell shape and adhesion to direct migratory mechanics"

B.S. Electrical Engineering (with Distinction), University of Kansas, 1999

Employment History:

Senior Fellow, Dept of Bioengineering, University of Washington, 2005-2006.

Project: "Deciphering the Olfactory Code: high throughput systems to combinatorially probe multiple odorant responses of olfactory sensory neurons"

Awards:

National Research Council Postdoctoral Fellowship, NIST, 2007

NSF IGERT Graduate Fellowship in Nanotechnology, UW, 2004

Whitaker Foundation Fellowship in Biomedical Engineering, 1999

Barry M. Goldwater Scholar, 1997

Nikon Small World 2008, Juried, Image of Distinction, 2008

"Images from Science 2008," 2 photos, Juried, 2008

Featured Photos, Science Illustrated (2009) and Discover Magazine (2008)

Latest Publications

- Magnetic connectors for microfluidic applications
- A vacuum manifold for rapid world-to-chip connectivity of complex PDMS microdevices

Javier Atencia, Research Chemist

EDUCATION

- 1998-2002 **Doctor in Electrical Engineering**, Universidad de Navarra, Spain.
Advisors Prof. Andres Garcia-Rico and Prof. Julian Florez.
“Design, Modeling, and Control of Linear Induction Motors”
- 1989-1995 ‘Ingeniero Industrial con especialidad en Ingenieria Electrica’ equivalent to a **Bachelor degree in Electromechanical Engineering** and **M. Eng. Electrical Engineering**, Universidad de Navarra, Spain
Advisor Prof. Paul Bustamante.
“Development of an ultrasonic system for measuring distances, integrated in a robot for inspection of Nuclear Power Plants.”
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PROFESSIONAL EXPERIENCE

- Fall 2010: Instructor of Design and Fabrication of MEMS (ENEE 605), University of Maryland College Park, US.
- 2005 - present Research Scientist at the National Institute of Standards and Technology, US.
- 2002 - 2005 Postdoctoral research fellow “Becas MECD/Fulbright” at the Department of Biomedical Engineering, U. Wisconsin-Madison. Advisor Prof. David Beebe.
- 2000 - 2002 Instructor of Introduction to Engineering Programming, Universidad de Navarra, Spain.
- 1997 - 1998 Quality Engineer at Bosch.GmbH, Laredo, Cantabria, Spain.
- 1996 - 1997 Electronic Design Engineer at Fraba Sicherheitsysteme.GmbH, Germany.
- 1996 Electronic Design Engineer at E.S.A.S. Madrid, Spain.
- 1995 Instructor of Electrical Circuits, Universidad de Piura, Peru.
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RESEARCH INTERESTS

- Development of enabling technologies for cellular dynamic assays with impact on drug discovery and cell biology.
 - Rapid detection and isolation of pathogens from complex media such as blood, feces and perishable foods
 - Bacterial signal transduction and its relevance on biofilm formation and pathogen-host interactions.
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SELECTED PUBLICATIONS

- Atencia, J., J. Morrow, and L.E. Locascio (2009).** "The microfluidic palette: A diffusive gradient generator with spatio-temporal control" *Lab on a Chip* **9(18): 2707-2714.**
- Featured in the July top ten news in the Department of Commerce web site, USA.
 - Featured in over 20 scientific news media, including an interview in *Bioetchniques*.
 - Patent applied for and licensed.
- Atencia, J. and D.J. Beebe (2005).** "Controlled microfluidic interfaces" *Nature* **437(7059): 648-655.**

RESEARCH EXPERIENCE

- Since 2008 Research scientist at the Biochemical Science Division, National Institute of Standards and Technology.
- Generation of static chemical gradients for toxicology assays.
 - Design and development of microfluidic tools to quantify bacterial chemotaxis and study bacterial community dynamics.
 - Novel methods to interface microfluidic systems with the macroscale.
- 2005-2007 Research scientist at the Analytical Chemistry Division, National Institute of Standards and Technology.
- Development of new fabrication technologies for the creation of microfluidic devices with 3-D topography
 - Design and development microfluidic devices for various applications such as sorting and storing liquid plugs using capillary forces for combinatorial assays, and for cell transfection and healthcare applications.
- 2002- 2005 Postdoctoral research at the Department of Biomedical Engineering, University of Wisconsin-Madison.
- Development of a bio-inspired micropumps for artificial circulatory systems
 - Development of microfluidic platforms for the separation of particles using laminar flow

TEACHING EXPERIENCE

- Instructor ENEE 605, Design and Fabrication of Micro Electro Mechanical Systems (MEMS), University of Maryland College Park. **Fall 2010**
- Guest Lecturer ENEE 605 University of Maryland College Park. **Fall 2006 and Fall 2008**
- Introduction to microfluidic systems.
 - Two hours ~ 12 students.
- Instructor Introduction to Engineering Programming 101 (6 credits), Universidad de Navarra, Spain, **Fall 2000 and Fall 2001.**
- Course contents: Matlab programming for engineering applications.
 - Managed two classes with 350 students total, and 5 Teaching Assistants.
 - Wrote the textbook for the course “Aprenda Matlab 6.0 como si estuviera en primero” (Matlab 101) published on-line. The book has been adopted by several Spanish speaking Universities as reference material for similar courses.

Andrew (Drew) Hirshfeld, Chief of Staff to the Under Secretary of Commerce for Intellectual Property and Director of the USPTO

Andrew Hirshfeld is the Chief of Staff for the Under Secretary and Director and Deputy Under Secretary and Deputy Director. In this capacity he provides oversight and directs activities of the Office of the Under Secretary and Director. He is the chief advisor on policy determining issues and related matters of an administrative support nature. Mr. Hirshfeld serves as the primary liaison between the Under Secretary and senior executives throughout the agency and relays the Under Secretary's policy viewpoints with regard to major programs, correspondence, proposed legislation and related matters.

Prior to serving as the Chief of Staff, Mr. Hirshfeld was the Associate Commissioner for Patent Examination Policy. In this capacity, he established patent examination and documentation policy standards for the Commissioner for Patents. Further, Mr. Hirshfeld was the authority on patent laws, rules, and examining practice and procedure, and provided administrative oversight and direction for the activities of the Office of Petitions, Office of Patent Legal Administration, Office of Patent Cooperation Treaty Legal Administration, and the Office of Patent Quality Assurance.

Mr. Hirshfeld began his career at the USPTO in 1994 as a Patent Examiner. He became a Supervisory Patent Examiner in 2001, and was promoted to the Senior Executive Service in 2008 as a Group Director in Technology Center 2100, Computer Architecture and Software.

Mr. Hirshfeld received a Bachelor of Science from the University of Vermont, and a J.D. from Western New England College School of Law.

Summary

Science Afternoon at NIST: From Invention to Marketplace

On May 12, 2011 Greg Cooksey and Javier Atencia of NIST gave presentations about their backgrounds as scientists, how they became interested in science, how they came to NIST, and the inventions they've made. Andrew Hirshfield, of the USPTO, followed with a presentation on the patent process.

Supplemental Materials for Teachers:

Links to Educational Outreach materials at the USPTO

USPTO for Kids: <http://www.uspto.gov/kids/index.jsp>

Final Frontiers – the MCPS program designed to inspire inventiveness and creativity

<http://www.montgomeryschoolsmd.org/SCHOOLS/WOOTTONHS/academics/science/finalfront/>

Javier just found this blog post, “The Earth is flat, and creativity can’t be trained,” <http://blog.the-scientist.com/2011/05/25/the-earth-is-flat-and-creativity-cant-be-trained/> in *The Scientist*, a magazine for all scientists with a focus on biology. Interesting perspective – and even the comments are interesting!

A webcomic of romance, sarcasm, math, and language: <http://www.xkcd.com/>. I especially like <http://www.xkcd.com/896/>.

Other ideas for connecting with scientists: “1000 Scientists in 1000 Days Program” <http://www.scientificamerican.com/page.cfm?section=calling-all-scientists>

Editorial in *Nature* re “1000 Scientists in 1000 Days” :

<http://www.nature.com/nature/journal/v473/n7346/full/473123a.html>



Dr. Javier Atencia talks about his background, how he became interested in science – he credits his teachers - his current research, and how he invents tools for his research. Javier has invented magnetic connectors which enable simple and efficient connection of microfluidic channels. This invention, which is currently proceeding through the patent process, has already been licensed and is on the market.



Dr. Greg Cooksey demonstrates one of the tools he has designed for controlling the pressure-driven flow rates of large numbers of fluid reservoirs to a microchip in an efficient and compact fashion.



Drew Hirshfield, Chief of Staff at the USPTO, talks about the patent process and how inventions such as those by Javier and Greg proceed through the process and are brought to market.



Teachers from Montgomery County Public School District visit with Joyce Ward, Educational Coordinator of the United States Patent and Trade Office (uspto.org), about opportunities to teach and use the invention process in the middle school science classroom.