

# Dr. J. Zoval

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**Education**      1990 - 1996 University of California, Irvine      Irvine, CA  
▪ Ph.D. Degree, **Chemistry**

1988 - 1990 University of California, Irvine      Irvine, CA  
• BS Degree, **Chemistry**

**Professional Experience**      8/2008 – Present      Saddleback College, Mission Viejo, CA  
**Assistant Professor of Chemistry**

Teaching:      Introduction to General, Organic, and Biochemistry

9/2007 – 7/2008      Orange Coast College, Orange, CA

## **Chemistry Instructor**

• Teaching:      Introduction to General, Organic, and Biochemistry

2/2007 – 7/2008      Santiago Canyon College, Orange, CA

## **Chemistry Instructor**

• Teaching:      Introductory Chemistry, General Chemistry.

9/2007 – 7/2008      Tesoro High School, Mission Viejo, CA

## **Chemistry Instructor**

• Teaching:      General High School Chemistry

11/2002-present      University of California, Irvine, CA

## **Specialist IV**

- Substitute Teaching:      Graduate Thermodynamics, Graduate and Undergraduate Biochemical/Biomedical Engineering (BioMEMS), Graduate and Undergraduate Fundamentals of Microfabrication
- Management of research in Polymer Physical Chemistry, Nanotechnology, Biochemistry, Molecular Biology, Materials Science, Spectroscopy, and Microscopy. Supervise 15 post-doc and graduate students. Proposal writing and teaching is also part of the position.

**3/2000- 9/2002 Nanogen Inc., San Diego, CA**

**Senior Project Engineer**

- Development of new platforms for medical diagnostic applications. Areas of work include: surface chemistry of biomolecule attachment, microfluidic design fabrication and characterization, fluorescence microscopy and spectroscopy, Atomic Force Microscopy, photolithography, sample preparation platform development, and cantilever based assay platform development.
  
- Writing proposals for government funding of R&D projects.
- Management of “Lab on a Disc” collaboration with NASA. Using photolithographic based microfluidic fabrication on a centrifugal disc, an assay platform was developed for use in space.

**1/1999 – 4/2000 Burstein Technologies, Irvine, CA**

**Senior Manager, Platform Development**

- Development of CD based instrument and medical diagnostic assays. Immuno and DNA assay developmental research. DNA array imaging, application and characterization of reactive plastics to surfaces for covalent bonding and absorption of DNA for hybridization assays. Covalent and absorptive application and characterization of antibodies to solid state for immunoassays. Organic synthetic chemistry, Polymer chemistry, Atomic Force Microscopy.
- Responsible for technical marketing presentations for VC and private investors. Presentation of technical materials for new hire education.
- Involvement in IP portfolio development and research. Inventor on several patents for novel diagnostic CD designs, microfluidics, and chemistry.
- Developed pressure sensitive adhesive based microfluidic systems.

**7/1997 – 1/1999 Lightsense Corporation Laguna Hills, CA**

**Research Scientist**

- Development of sensor devices, specifically fluorescence based oxygen, carbon dioxide, and glucose sensors.
- Inventor for self-referencing, oxygen sensing dye and a method of attaching fluorophores to siloxane polymers.

- Optical design of LED/Photodetector fluorescence sensing devices
- Organic synthetic chemistry, Polymer synthetic chemistry, Chromatography, UV -VIS and fluorescence spectroscopy.

9/1990 – 7/1996 University of California, Irvine Irvine, CA

**Graduate Teaching Assistant/Research Chemist**

- Teaching discussion sections and lab sections for: General Chemistry, Inorganic Chemistry, Physical Chemistry, Quantitative Analysis, Instrumental Chemistry, and Computational Chemistry.
- Graduate Research: Laser Spectroscopy, Condensed Phase Photodynamics, IR and FTIR spectroscopy, Electrochemistry, Nanometer scale chemistry, Atomic Force Microscopy, Scanning Tunneling Microscopy, Optical Microscopy, Organic Physical Chemistry, GC, LC, HPLC, NMR

9/1995 – 7/1998 Golden West College Huntington Beach, CA

**Chemistry Instructor**

- Chemistry Instructor. Teaching: introductory chemistry, general chemistry, organic chemistry, and biochemistry.

**Selected**

**Publications**

1. Guangyao Jia , Jonathan Siegrist, Chengwu Denga, Jim V. Zoval, Gale Stewart, Regis Peytavi, Ann Huletsky, Michel G. Bergeron, Marc J. Madou, **A Low-Cost, Disposable Card for Rapid Polymerase Chain Reaction**, *Colloids Surf. B: Biointerfaces Special Edition*, (2007), in press.
2. Nahui Kim, Catherine M. Dempsey, Jim V. Zoval, Ji-Ying Sze, Marc J. Madou, **Automated microfluidic compact disc (CD) cultivation system of *Caenorhabditis elegans***, *Sensors and Actuators B*, 122 (2007) 511–518.
3. Benjamin Y. Park, Lili Taherabadi, Chunlei Wang, Jim Zoval, and Marc J. Madou, **Electrical Properties and Shrinkage of Carbonized Photoresist Films and the Implications for Carbon Microelectromechanical Systems Devices in Conductive Media** *J. Electrochem. Soc.*, Volume 152, Issue 12, pp. J136-J143 (2005)
4. K-S Ma, G-Y Jia, Q. Xu, H. Zhou, C-L Wang, J. Zoval and M. Madou, **Fabrication of Nanometer-Sized Structures by C-NEMS Technology**, *Technical Proceedings of the 2005 NSTI Nanotechnology Conference and Trade Show*, V2, 2005, p. 151 – 154.

5. K-S Ma, H. Zhou, A. Fischetti, J. Zoval and M. Madou, **Detection of DNA Hybridization with Impedance Amplifying Labels**, *Technical Proceedings of the 2005 NSTI Nanotechnology Conference and Trade Show*, V1, 2004, p. 31 – 34.
6. Chong Wang, Han Xu, ChunLei Wang, Jim Zoval, and Marc Madou, **Polypyrrole actuators as valves for controlled drug delivery**, *Proceedings of SPIE, Smart Structures and Materials 2004: Electroactive Polymer Actuators and Devices (EAPAD)*, Yoseph Bar-Cohen, Editor, V. 5385, July 2004, pp. 468-474
7. Han Xu, Chong Wang, Chunlei Wang, Jim Zoval, and Marc Madou., **Polymer Actuator Valves toward Controlled Drug Delivery Application**, *Biosensors and Bioelectronics*, Vol 21/11 pp 2094-2099, 2006
8. Han-Kuan A Tsai, Kuo-Sheng Ma, Chong Wang, Han Xu, Chunlei Wang, Jim Zoval, Lawrence Kulinsky and Marc Madou, **Development of integrated protection for a miniaturized drug delivery system**, *Smart Mater. Struct.* 16, 2007, S295-S299
9. Nicholson, A. D.; Moschou, E. A.; Jia, G.; Zoval, J.; Bachas, L. G.; Madou, M. J., Zoval, J. and Daunert, S.  
**Protein Chromatographic Analysis on Methacrylate-Based Monolithic Columns Integrated on Compact Disk Microfluidic Platforms**, *Analytical and Bioanalytical Chemistry*, V. 385, N. 3, 2006, pp 596-605.
10. Kim, J.; Jang, S. H.; Jia, G.; Zoval, J. V.; Da Silva N. A. and Marc J. Madou, **Cell Lysis On a Microfluidic CD (Compact Disc) Lab On a Chip** 4 (5): 516-522 , 2004
11. Régis Peytavi, Frédéric R. Raymond, Dominic Gagné, François J. Picard, Guangyao Jia, Jim Zoval, Marc Madou, Karel Boissinot, Maurice Boissinot, Luc Bissonnette, Marc Ouellette and Michel G. Bergeron: **Microfluidic Device for Rapid (<15 min) Automated Microarray Hybridization**, *Clinical Chemistry*. 2005;51:1836-1844
12. Marc Madou, Jim Zoval, Guangyao Jia, Horacio Kido, Jitae Kim, and Nahui Kim, **Lab on a Disc**, *Annual Review of Biomedical Engineering*, Vol. 8, 2006, p. 601-628
13. Kim, J H S; Marafie, A; Jia, X Y; Zoval, J V; Madou, M J, **Characterization of DNA hybridization kinetics in a microfluidic flow channel**, *Sensors and Actuators B.*, Vol. 113, no. 1. 17 Jan. 2006

14. Jia, G.; Ma, K.; Kim, J.; Zoval, J. V. and Madou, M. J.; Peytavi, R. and Bergeron, M. G., **Dynamic Automated DNA Hybridization and Detection on a CD (compact disc) Fluidic Platform**, *Sensors and Actuators B*. Vol. 114, no. 1, pp. 173-181. 30 Mar. 2006
15. Ma, K.; Zhou, H.; Zoval, J. V. and Madou, M. J. **DNA hybridization detection by label free versus impedance amplifying label with impedance spectroscopy** *Sensors and Actuators B*. Vol. 114, no. 1, pp. 58-64. 30 Mar. 2006
16. Zoval, J. V. and Madou, M. J., **Centrifuge Based Fluidic Platforms**, *Proceedings of IEEE*, 92, 140-153, 2004
17. Wang, Chong; Xu, H.; Wang, Chunlei; Zoval, J. V.; and Madou, M. J. **Artificial muscle valves for responsive drug delivery systems** *Proceedings of SPIE International Symposium-Photonics Europe*, 26 - 30 April 2004, Strasbourg, France
18. Wang, C.; Taherabadi, L.; Jia, G.; Kassegne, S.; Zoval, J. V. and Madou, M. J. **Carbon-MEMS architectures for 3D microbatteries** *Proceedings of SPIE International Symposium-Photonics Europe*, 26 - 30 April 2004, Strasbourg, France
19. Samuel Kassegne, Marc Madou, Ralph Whitten, Jim Zoval, Elizabeth Mather, Kamal Sarkar, Dalibor Hodko, Sandipan Maity **Design Issues in SOI-Based High Sensitivity Piezoresistive Cantilever Devices**, *Proceedings of the SPIE Conference on Smart Structures and Materials*, San Diego, CA, March 17-21, 2002.
20. Zoval J.V.; Apkarian VA. **"Cage Exit Versus Cage-Induced Reaction Upon Photodissociation of Matrix-Isolated H<sub>2</sub>S - Experiment and Statistical Theory"** *Journal of Physical Chemistry*, 98 (1995) 7945-7957.
21. Zoval J.V.; Imre D; Apkarian VA. **"Spectroscopy of SH (A-X) Transition in Ar and Kr Matrices - The Cage-Effect of Predissociation"** *Journal of Chemical Physics*, 98 (1994) 1-7.
22. Zoval J.V.; Imre D; Ashjian P; Apkarian VA. **"Photodissociation Dynamics of H<sub>2</sub>S Isolated in Krypton Matrices"** *Chemical Physics Letters*, 197 (1992) 549-555.

23. Zoval J.V., Stiger, R. M., Biernacki, P., Penner, R. M.  
**"Electrochemical Deposition of Silver Nanocrystallites on the Atomically Smooth Graphite Basal Plane"**  
Journal of Physical Chemistry, 100 (1995) 837.
24. Zoval J.V., Biernacki, P., Penner, R.M.  
**"Implementation of Electrochemically Deposited Silver Nanocrystallites For the Preferential SERS of Defect Modes on Thermally Etched Graphite Surfaces"**  
Analytical Chemistry, 68 (1995) 1585.
25. . Zoval J.V. and Penner, R. M.  
**"Electrochemical Deposition of Platinum Nanocrystallites on HOPG: Particle Size Control and Chemical Applications"**  
Journal of Physical Chemistry. (1996) Manuscript in Preparation.
26. J.V. Zoval, J. Lee, S. Gorer  
**Electrochemical Preparation of Platinum Nanocrystals With Size Selectivity on Basal Plane Oriented Graphite Surfaces**, J. Phys. Chem. B, 102 (1998) 1166.

## **Patents**

- Zoval J.V.; Kido, H.; Virtanen J.A.  
**Optical Biodiscs with Reflective Layers**  
U.S. Patent Application No. 09/999,274
- J. V. Zoval, **DEVICE AND METHODS FOR PROCESSING SAMPLES AND DETECTING ANALYTES OF LOW CONCENTRATION**, International Application No. PCT/US2005/00092, 2005
- H. Kido, J. V. Zoval, M. Madou, J. Kim, G. Jia, **Microfluidic Device for Liquids**, WO Patent WO/2006/099,042, 2006
- Zoval J.V.; Kido, H.; Virtanen J.A.  
**Novel Optical Methods for CD Imaging**  
U. S. Patent No. 999274, November 15, 2001
- Werner, Martina Elisabeth, Valencia, Ramon Magpantay, Virtanen, Jorma Antero, Zoval, Jim Vincent, **Surface assembly for immobilizing DNA capture probes and bead-based assay including optical bio-discs and methods relating thereto**  
U.S. Patent No. 035836, December 21, 2001

## **Presentations**

Chunlei Wang, Lili Taherabadi, Rabih Zaouk, Marc Madou, Yuting (Tim) Yeh and Bruce Dunn

### **C-MEMS Technology for Li Ion Microbatteries**

Electrochemical Society Conference, October 12, 2004, Honolulu, Hawaii

Wang, Chong; Xu, H.; Wang, Chunlei; Zoval, J. V.; and Madou, M.J.

### **Artificial muscle valves for responsive drug delivery systems**

Proceedings of SPIE International Symposium-Photonics Europe, 26 - 30 April 2004, Strasbourg, France

Wang, C.; Taherabadi, L.; Jia, G.; Kassegne, S.; Zoval, J. V. and Madou, M. J.

### **Carbon-MEMS architectures for 3D microbatteries**

Proceedings of SPIE International Symposium-Photonics Europe, 26 - 30 April 2004, Strasbourg, France

J. Zoval & Marc Madou

### **Centrifugal Microfluidic Platform**

American Chemical Society Symposium, 2005, San Diego, CA

J. Zoval, H. Kido, M. Madou Group

### **Centrifugal (CD) Microfluidic Platform for Nucleic Acid Analysis**

Montreal Microarray Symposium  
Oct 12-13, 2006