

Hardik Jeetendra Pandya

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RESEARCH AND DEVELOPMENT

Research scientist in semiconductor device fabrication, microelectronics, and academic domains with rich exposure predominantly in the areas of fabrication and characterization of micro-electro-mechanical systems, microsystems and nanotechnology. Expertise in design and fabrication of Micro-Actuators using MEMS technology as well as preparation and execution of microelectronic experiments for M.Tech students. Skilled in developing innovative new device concepts, planning, and conducting experimental design and device characterization. Hands-on-experience in Working in Clean Room (Class 100) for MEMS fabrication including anodic bonding, wafer-to-wafer bonding, synthesis of semiconductor nanowires and semiconducting oxide nanostructures, fabrication of sensors using integration of nanostructured metal oxides on MEMS platform for detection of volatile organic compounds (VOCs), fabrication of Bio-MEMS and Microfluidics and knowledge of process simulator IntelliSuite.

CORE COMPETENCIES

Research Methodologies ▪ Design and Fabrication ▪ Sensor Testing ▪ Interdepartmental Liaison ▪ Trend Analysis ▪ Strategy Recommendation ▪ Mentoring and Evaluating Students ▪ Leadership and Management Skills ▪ Developing Course Materials ▪ Synthesis and Characterization of Nano Materials ▪ Filing Patents and Publishing Results ▪ Coordinating with Process Integration Team

KEY SKILLS

- **Research Methodologies** – Expertise in research, fabrication and characterization of micro-electro-mechanical-systems based devices such as sensors, actuators, micro-fluidics, and Bio-MEMS.
- **Teaching and Mentoring** – Skilled in successfully delivering lectures on various subjects including Solid-State Devices and Circuits and VLSI Technology and Design. Experience in developing course materials, teaching/presentation, paper setting and evaluation of undergraduate students of Electronics and Communication and Electronics and Instrumentation courses.
- **Patents and Publications** – Expertise in capturing innovative ideas, filing patents and publishing results in referred international journals and making presentations at conferences.
- **Domain Expertise** – Hands-on-experience working in clean room (Class 100) for MEMS fabrication including wafer polishing (CMP), deposition of thin films by RF sputtering technique and thermal evaporation, growing silicon dioxide films by thermal oxidation system, diffusion process, PECVD, Deep-reactive-ion-etching, mask designing using Intelli-CAD and mask making, photolithography and etching (wet, anisotropic).
- **Liaising Skills** – Coordinating with process integration team from various fields such as biochemistry, instrumentation, mechanical engineering, electronics and material science for fast prototyping and demonstration.
- **Languages Known** – English, Hindi, Gujarati and Marathi.

KEY ACHIEVEMENTS

- Bestowed with gold medal for securing highest marks in M.Sc. Electronics.
- Filed three Indian patents for bio-sensor, micro-heater and MEMS sensor.
- Received award for Best Poster Presentation entitled “Zinc Oxide Nanostructures by Oxidation of Zinc Films Deposited on Oxidized Silicon Substrate” at ISSMD 2011 during 28-30 January 2011.
- Played a pivotal role in the project entitled “Development of Biosensor and Microtechniques for Analysis of Pesticides Residues, Aflatoxin, Heavy Metals and Bacterial Contamination in Milk” by fabricating several innovative micro-electro-mechanical systems based devices —Patent filing of these devices are in progress.

CAREER HISTORY

Postdoctoral Fellow

Sep 2012 – Present

A. James Clark School of Engineering, University of Maryland

Project: *Mechano-Visual Phenotyping of Cancer: From Onset through Disease Progression.*

- Responsible for designing and fabrication of micro-actuators using MEMS technology.

Research Associate

Nov 2010 – Aug 2012

Indian Institute of Technology, Delhi

Project: *Development of Biosensor and Microtechniques for Analysis of Pesticides Residues, Aflatoxin, Heavy Metals and Bacterial Contamination in Milk*

- Responsible for design and fabrication of micro fluidic devices and micro wells with certain prerequisites as per project requirement.
- Accountable for fabrication of Bio-MEMS in accordance with project requirement.
- Preparation and execution of Microelectronics Experiments for M.Tech. Students, CARE, IIT, Delhi.

Sr. Research Fellow

May 2009 – Nov 2010

Indian Institute of Technology Delhi

Project: *Development of Biosensor and Microtechniques for Analysis of Pesticides Residues, Aflatoxin, Heavy Metals and Bacterial Contamination in Milk*

- Administered design and preparation of masks and fabrication of different devices as per project requirement.
- Responsible for design and fabrication of micro-heaters which can reach up to 80 °C even at low power.
- Designed a micro-well having certain patterned inside the well in compliance with project requirement.
- Accountable for design and fabrication of micro-fluidic devices and Bio-MEMS.

Project Fellow

Jun 2004 – Jul 2006

Sardar Patel University, Gujarat

Project: *Development of Selective and Sensitive Gas Sensors using Indium Oxide and Indium Tin Oxide for Detection of VOCs (Volatile Organic Compounds)*

- Oversaw fabrication of sensors and established test set-up for sensor testing.
- Gained thorough knowledge and made effective use of software including ANN (Artificial Neural Network).

Teaching (Lecturer)**Aug 2006 – Feb 2009**

Department of Electronics, Invertis Institute of Engineering and Technology, Bareilly, U.P

- Delivered lectures on various subjects such as solid state devices and circuits, semiconductor material and devices and VLSI technology and design to undergraduate students.

EDUCATIONAL QUALIFICATIONS**Ph.D.****July 2008 – Thesis submitted on 7th of May 2012**

Instrument Design Development Centre, Indian Institute of Technology, Delhi

Thesis Title: Novel Techniques for MEMS-Based VOC Sensors Using Nanostructured Metal Oxides

M.Sc. in Electronics**July 2002 – Jun 2004**

Sardar Patel University, Vallabh Vidyanagar, Gujarat, India

B.Sc. Degree in Electronics**March 1999 – Jun 2002**

Sardar Patel University, Vallabh Vidyanagar, Gujarat, India

PROFESSIONAL AFFILIATION

- Student member of the Institute of Electrical and Electronics Engineers (IEEE) (92155929).

PATENTS, PUBLICATIONS AND CONFERENCES

Please refer appendix

COMPUTER SKILLS

- Proficient in MS Office applications

PERSONAL INFORMATION**Date of Birth:** 17th Nov, 1981**Nationality:** Indian**Marital Status:** Married

VISA Status: Currently on J1 Visa.

Can work with any company if Wavier is applied and approved.

References available on request

Appendix:

Patents Filed:

- 1. A Microwell Biosensor Chip** (Application filing Number: 933/MUM/2012/29 March 2012)
- 2. An improved microheater in silicon substrate using trench formation, backfill and CMP.** (Application filing Number: 1619/DEL/2012/29 May 2012)
- 3. MEMS Based Energy Efficient Sensors on Oxide Platform in Silicon Substrate for Detection of Volatile Organic Compounds and Gases.** (Application filing Number: 1802/DEL/2012/12 June 2012)

Publications

Journals (Referred International)

- 1) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "Integration of ZnO Nanostructures with MEMS for Ethanol Sensor", ***Sensors and Actuators B***, vol. 161, 923-928, 2012.
- 2) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "A Simple Technique to Grow Long and Vertically Aligned CuO Nanowires on Oxidized Silicon Substrate", ***Nanoscience and Nanotechnology Letters***, vol. 3(6), 773-777, 2011.
- 3) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "Fabrication and Characterization of Low Temperature Acetone Sensor using CuO Nanowires", ***Nanoscience and Nanotechnology Letters***, vol. 3(6), 744-748, 2011.
- 4) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "MEMS Based Ethanol Sensor using ZnO nanoblocks, nanocombs and nanoflakes as Sensing layer", ***Sensors and Transducers***, vol. 134, issue 11, pp. 85-94, 2011.
- 5) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "A Novel Sensor for VOCs Using Nanostructured ZnO and MEMS Technologies" ***Sensors and Transducers***. Vol. 14, issue 1, pp. 244-252, 2012.
- 6) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "Nanostructured ITO Thin Films by RF Magnetron Sputtering for Acetone Sensor", ***International Journal of Nanoscience***, vol. 10, pp.1-4, 2011.
- 7) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "Fabrication and Characterization of Ethanol Sensor Based on RF Sputtered ITO Films", ***Sensors & Transducers***, vol. 10, pp.141-150, 2011.

- 8) **H. J. Pandya** and S. Chandra, "Zinc Oxide Nanostructures by Oxidation of Zinc Films Deposited on Oxidized Silicon Substrate", *J. Nano.-Electron. Phys.*, vol. 3, pp.209-213, 2011.
- 9) **H. J. Pandya**, V. S. Vaishnav, "Detection and classification of volatile organic compounds using Indium Tin Oxide sensor array and artificial neural network", *International Journal of Intelligent Systems Technologies and Applications*, vol. 7(1), pp. 72-79, 2009.
- 10) **H. J. Pandya**, "Thin film Indium Tin Oxide acetone sensor", *Int. J. Signal and Imaging Systems Engineering*, vol. 2 (1/2), pp. 66-69, 2009.
- 11) **H. J. Pandya**, "Thin film Tin Oxide-ethanol sensor", *Int. J. Signal and Imaging Systems Engineering*, Vol. 2 (1/2), pp. 3-6, 2009.

Conferences (International)

- 12) Sudhir Chandra, **H. J. Pandya** and A. L. Vyas, "A Methanol Sensor Incorporating Nanostructured ZnO and Integrated Micro-heater on Thermally Isolated Planar MEMS Platform", Proceedings of International Conference on Sensor Device Technologies and Applications (***SENSORDEVICES 2012***), Rome, Italy, August 19-24, (2012) 83-88. (ISBN: 978-1-61208-208-0)
- 13) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "MEMS-based Ethanol Sensor Using Zinc Oxide Nanostructured Films", Proceedings of International Conference on Sensor Device Technologies and Applications (***SENSORDEVICES 2011***), NICE, France, August 21-27, (2011) 69-74.
- 14) **Hardik Pandya**, Sudhir Chandra and A. L. Vyas, "A Novel Method of Preparing Nano-Structured Zinc Oxide on Oxidized Silicon Substrate and its Application in Ethanol Sensing", Inter. Conf. on Materials for Advanced Tech. (***ICMAT 2011***), Singapore, June 26-July 1, (2011) (**Oral Presentation**).

- 15) **Hardik Pandya**, Sudhir Chandra and A. L. Vyas, "Synthesis and Characterization of CuO Nanowires by Oxidation of Cu Films on Oxidized Silicon and Their Application in Alcohol Sensor", Inter. Conf. on Materials for Advanced Tech. (*ICMAT 2011*), Singapore, June 26-July 1, (2011) **(Oral Presentation)**.
- 16) **H. J. Pandya**, A. L. Vyas and Sudhir Chandra "A Complete Electronics Module for Volatile Organic Compound Vapors using MEMS-Based Sensors", *2nd International Conference on Bio-Sensing Technology*, Amsterdam, The Netherlands, October 10-12, 2011.
- 17) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "A Sensor Platform using Nanostructured Oxides for VOC Monitoring of Environment", *2nd International Conference on Bio-Sensing Technology*, Amsterdam, The Netherlands, October 10-12, 2011.
- 18) **H. J. Pandya**, Sudhir Chandra, A. L. Vyas, "Integrated MEMS Based Acetone Sensor using Zinc Oxide Nanostructured Films for Clinical Applications", *2nd International Conference on Bio-Sensing Technology*, Amsterdam, The Netherlands, October 10-12, 2011.
- 19) **H. J. Pandya**, Rupesh Mishra, Sunil Bhand and Sudhir Chandra, "A Novel Micro-biosensor for Glucose and Mercury Analysis", *2nd International Conference on Bio-Sensing Technology*, Amsterdam, The Netherlands, October 10-12, 2011.
- 20) Sudhir Chandra, **H. J. Pandya** and A. L. Vyas, "Integration of MEMS with Nanostructured Metal-oxide Materials for Improved Sensors for Volatile Organic Compounds", (*IWPSD 2011*) **(Accepted for publication in SPIE)**.
- 21) Sudhir Chandra, **H. J. Pandya** and A. L. Vyas, "ITO Thin Films by RF Sputtering for Ethanol Sensing", Proceedings of International Conference on Sensor Device Technologies and Applications (*SENSORDEVICES 2010*), Venice, Italy, July 18-25, (2010) 130-134. (archived in IEEE computer society).

- 22) **H. J. Pandya**, Sudhir Chandra and A. L. Vyas, "Properties of ITO Films Prepared by RF Magnetron Sputtering", Proceedings of International Workshop on Physics of Semiconductor Devices (*IWPSD 2009*), New Delhi, India, December 15-19, (2009) 246-248.