

MARIA FERNANDES

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EDUCATION

- **The University of British Columbia** Vancouver, BC
Ph.D., Mechanical Engineering July 2009
Dissertation: "A Battery-less Mechanical Device for On-Demand and Controlled Drug Delivery"
Sub-specialization: Engineering Management
- M.A.Sc., Mechanical Engineering December 2003
Concentration: Control and Manufacturing
Dissertation: "Fault Detection and Diagnosis in an Attitude Determination System"
- **National Autonomous University of Mexico** Mexico City, Mexico
B. Sc., Mechanical Engineering August 1999
Concentration: Solid Mechanics
Dissertation: "Determination and Analysis of Defining and Communicating Tolerances"

HONORS AND AWARDS

- The Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial R&D Fellowship March 2009
- Designated "Department Scholar", Department of Mechanical Engineering, UBC January 2008
- Faculty of Applied Science Graduate Award, UBC September 2007 – May 2009
- The Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship June 2006 – June 2009
- Four Year Fellowships (FYF) Award, UBC September 2006
- The University of British Columbia Graduate Fellowship (UGF) September 2005 – June 2006
- Ph.D. Tuition Fee Scholarship, UBC January 2004 – December 2007
- International Partial Tuition Fee Scholarship, UBC September 2001 – December 2003
- Ranked 3rd among 1999 class graduates in the field of Solid Mechanics in the Mechanical Engineering Department at National Autonomous University of Mexico September 1999

PUBLICATIONS

Journal Papers

1. **M.R. Fernandes**, L.T. Wong, T.J. Smith, P. Motamedi, 2011, "On-Demand Controlled Release of an Anti-mitotic Drug from a Battery-less Mechanical Drug Delivery Device", *Lab on a Chip*, DOI: 10.1178/c11c98134d.
(Highlighted article, in the Royal Society of Chemistry News:
<http://www.rsc.org/chemistryworld/News/2009/May/21083102.asp>)

2. **M.R. Fernandes**, L.T. Wong, H.M. Burt, P. Motamedi, 2011, “A Magnetically Controlled Mechanical Drug Delivery Device: Design, Fabrication, and Testing”, *Lab on a Chip*, DOI: 10.2129/c11c2228f.
3. L.T. Wong, **M.R. Fernandes**, S.L. Wilson, D. Finnegan, P. Motamedi, T.J. Smith, 2009, “Increased Accumulation of a Mitotic Inhibitor and an Anthracycline Antibiotic in Cancer Cells Following Ultrasound Exposure”, *Ultrasonics*, DOI:09.1123/j.ultras.2009.11.077.
4. S.L. Wilson, L.T. Wong, **M.R. Fernandes**, P. Motamedi, T.J. Smith, 2009, “Increased Accumulation and Retention of an Experimental Drug in Drug Sensitive and a Multidrug Resistant Cell line Following Ultrasound Exposure”, *Ultrasound in Medicine and Biology*, submitted.
5. **M.R. Fernandes**, J. McKinlay and P. Motamedi, 2010, “Magnetic Poly Composite Incorporated with Uniformly Dispersed Coated Nanoparticles”, *Journal of Micromechanics and Microengineering* 15, No.2, pp. 14111-14191.
6. **M.R. Fernandes**, P. Motamedi, “Potential for Magnetically Controlled Drug Delivery Devices”, *Nanomedicine*, in preparation.
7. **M.R. Fernandes**, L.T. Wong, E. Lin, P. Wong, T.J. Smith, P. Motamedi, “Preparation of Porous Poly Membrane for Biomedical Applications”, in preparation.
8. **M.R. Fernandes**, T. Henriksen and F. Dias, 2009, “Fault Detection and Diagnosis in a Attitude Determination System”, *Acta Astronautica* 44, Issues 2-3, pp. 656-673.

Book Chapter

9. **M.R. Fernandes**, T. Henriksen and F. Dias, 2006, “Introduction to Monitoring”, in the book *MECHATRONIC SYSTEMS - Devices, Design, Operation, and Monitoring*, 1st ed., F. Dias, Ed., Wilson & Nicols/CRC Press, Boca Raton, FL, Ch. 19.

Conferences

10. **M.R. Fernandes**, J. McKinlay, S. Suzuki, T.J. Smith, P. Motamedi, 2009, “Delivery of an Anti-cancer Drug from a Magnetically Controlled Mechanical Delivery Device Shows Cytotoxicity”, *The 14th International Conference on Solid-State Sensors, Actuators and Microsystems*, Helsinki, Finland, June 11-16.
11. S.L. Wilson, S. Suzuki, **M.R. Fernandes**, P. Motamedi, T.J. Smith, 2010, “Increased Accumulation of Paclitaxel in Cell Lines Following Ultrasound Irradiation”, *Pharmaceutical Sciences World Congress (PSWC)*, Pittsburgh, Pennsylvania, USA, Oct 11 to 15.
12. **M.R. Fernandes**, J. McKinlay, S. Suzuki, T.J. Smith, P. Motamedi, 2010, “A New Magnetically Controlled Drug Delivery Device”, *The 6th International Conference on Magnetic Carriers*, Istanbul, Turkey, Dec 13 to 17.
13. **M.R. Fernandes**, T. Henriksen and F. Dias, 2004, “An Efficient Algorithm for Health Monitoring in Attitude Determination System”, *IEEE International Conference on Systems*, The Hague, Netherlands, June 18-21.
14. **M.R. Fernandes**, T. Henriksen and F. Dias, 2005, “Fault Detection in an Attitude Determination System”, *Proceedings of International Symposium on Collaborative Research in Applied Science (ISOCRIAS)*, Los Angeles, CA.

Technical Reports

15. **M.R. Fernandes**, K. Reid and P. Motamedi, 2004, “A Mechanical Delivery Device Pressure and Temperature Sensor Design and Analysis for Use in Pressure Monitoring”, *Final technical report to GTM Global Inc.*
16. **M.R. Fernandes** and E. Norman Zappinsky, 2001, “Analysis of Tolerances for Design of Mechanical Gauges”, *Final technical report to Tecnologia en Compresion SA*
17. **M.R. Fernandes** and E. Norman Zappinsky, 2002, “Dimensional Tolerances in Mechanical Gauges and Software Module Implementation”, *Technical report to Tecnologia en Compresion SA*

PATENTS

- P. Motamedi, **M.R. Fernandes**, and L.T. Wong, filed in September 2010, “Remotely Controlled Drug Delivery Systems” *US Provisional Patent No. 54168761.*

SELECT PRESENTATIONS

- Symposium on MEMS/NEMS and Robotics, Ritsumeikan University, Kyoto, Japan February 2007
- Mechatronics and Manufacturing Seminar Series, UBC, on Controlled Drug Delivery November 2007
- Mechatronics and Manufacturing Seminar Series, UBC, on Magnetic Polymer Membrane for Drug Delivery January 2007
- UBC MEMS Group Presentation on Recent Advancements in Drug Delivery Using MEMS Technology October 2006

TEACHING EXPERIENCE

- **The University of British Columbia**, Department of Mechanical Engineering Vancouver, BC
Lab Instructor and Project Supervisor September 2002 – Present
Supervised the final projects of 4th year students and interns in the MEMS lab.
- *Teacher Assistant* September 2001 – Present
Held lectures, tutorial sessions, lab experiments and office hours for the following advanced courses:
 - Mechanics of Materials (3 times)
 - Process Engineering (3 times)
 - Automatic Control course and laboratory (3 times)
 - Mechanical Engineering Labs (3 times)

PROFESSIONAL EXPERIENCE

- **Smith Lab, University of British Columbia** Vancouver, BC
Researcher September 2004 – Present
Investigated the effect of ultrasound on uptake and retention of polar and non-polar molecular agents in cancer and proliferative blood vessel cells as well as drug sensitive and multidrug resistant Expressing Cell lines. The effect of using drug in free form versus drug in micellar form was investigated.
- **GTM Global Inc.** Vancouver, BC
Research Engineer September 2003 – September 2005
Developed a wireless single chip MEMS pressure and temperature sensors for use in pressure monitoring. Derived the optimal design parameters, resistor dimensions, doping sheet resistance, and sensor layout while taking the fabrication processes into consideration.

- **Tecnologia en Compresion SA** Mexico City, Mexico
Design Engineer and Software Developer June 1999– June 2001
Designed and implemented mechanical gauges.
- **Volkswagen AG** Puebla, Mexico
Intern June 1997 – November 1998
Designed a fixture for vehicle assembly and prepared required engineering drawings.

TECHNICAL SKILLS

- Microfabrication and Cleanroom Experience (Wetbench Work, Polymer Processing, PECVD, SEM, etc.)
- Measurement and Characterization Techniques
Radioactive Counting, Spectrophotometry, HPLC, Thermo Mechanical Analyzer (TMA), Wyko Surface Profiler, Laser Ablation (Quicklaze), Laser Doppler Vibrometer
- Cell Culturing (PC3 and HUVEC Cells) and Viability Assays
- Use of Tracer Molecules such as Radiolabeled Drugs and Dyes
- Softwares (COMSOL Multiphysics, Matlab, ImageJ, Ansys)

PROFESSIONAL AFFILIATIONS

- Microsystems and Nanotechnology Group (MiNa), UBC May 2004 – Present
- Association of Professional Engineers & Geoscientists of B.C. (APEGBC) March 2003 – Present
- Division for Advancement of Women in Engineering and Geoscience (DAWEG) March 2003 – Present
- Institute of Electrical and Electronics Engineers (IEEE) January 2003 – Present
- Women in Engineering (IEEE) January 2003 – Present
- American Society of Mechanical Engineers (ASME) January 2003 – Present

EXTRACURRICULAR ACTIVITIES

- **The University of British Columbia**
Department of Mechanical Engineering Graduate Student Representative April 2003 – January 2006
House/Finance Committee Member in Graduate Students Society (GSS) December 2003 – January 2005
UBC Tri-Mentoring Program September 2003 – May 2007
Advised junior students in engineering careers
International Symposium on Collaborative Research in Applied Science (ISOCRIAS) October 2003
Member of the Executive Committee
- **National Autonomous University of Mexico**
6th Annual Conference of Mechanical Engineering May 1999
Member of the Executive Committee