

Christopher Rutherglen

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EDUCATION

- University of California, Irvine* (expected) **June 2009**
- PhD Electrical Engineering
- University of California, Irvine* **June 2007**
- M.S. Electrical Engineering
 - Cal-IT² Fellowship--
- California Institute of Technology* **June 2002**
- B.S. Physics

PROFESSIONAL HISTORY

Graduate Research Assistant **September 2003 – current**

Electrical Engineering, University of California, Irvine

- **Carbon Nanotube based RF-FET amplifier:** Design, fabricate, and tested single-walled carbon nanotubes based high-speed RF-FET transistor/amplifier. Project experience involved e-beam and photo-lithography, metal deposition with e-beam evaporator, RF-testing with network analyzer and other test instruments up to 20GHz, and RF modeling using Microwave Office.
- **Carbon Nanotube based AM Radio:** Designed, fabricated, and demonstrated a carbon nanotubes based AM Radio Receiver where the nanotube assumed the role of an AM demodulator. Project experience includes fabricating nanotubes using CVD, photolithography, RF-testing using signal & function generators and other test instruments up to 2GHz. (see publication 4 below)
- **Carbon Nanotube based 50Ω RF Interconnect:** Designed, fabricated, and tested the application of using massively parallel carbon nanotubes as RF interconnects up to 20GHz and achieving 50Ω impedance matching. Project experience involved e-beam and photo-lithography, metal deposition with e-beam evaporator, characterization with SEM, AFM, confocal microscopes and RF-testing with network analyzer and other test instruments up to 20GHz. (see publication 2)
- Additional work on
 - fabricating carbon nanotubes based patch antennas for microwave frequencies (see publication 10,11)
 - S-parameter measurements at cryogenic temperatures (~0.3K) and experience in setting up and operating a 3He cryogenic system.
 - designing and simulating the capacitance of a THz detector using a carbon nanotube based rf-single electron transistor. (see publication 5)

Test Engineer **January 2003 - September 2003**

Moseley Associates, Inc., Santa Barbara, CA

- Lead test engineer in the product launch of Moseley's first digital-video microwave link (1-10GHz) for the television broadcast market as well as testing experience with the voice/data digital microwave-radio relay links at the unit and systems level.
- Equipment experience using a network analyzer, spectrum analyzer, power meters, oscilloscopes, among others microwave test instruments.

Undergraduate Research Assistant **June 2000-August 2002**

Physics Dept., California Institute of Technology

Researched the biophysics of *in-vivo* neural network using the bioMEMs device, the Neurochip.

COMPUTER SKILLS

Languages: Java

Software: Labview, Microwave Office, Mathematica, Matlab, Microsoft Office, Corel Draw, Photoshop Igor, AutoCad

PUBLICATIONS

Patents

- 1) Chris Rutherglen, Peter Burke. Carbon Nanotubes for Wireless Communication and Radio Transmission. *US Patent 703538.4158* (Provisional)

Journal Papers

- 2) C. Rutherglen, D. Jain, P.J. Burke. RF Resistance and Inductance of Massively Parallel Single Walled Carbon Nanotubes: Direct, Broadband Measurements and Near Perfect 50 Ohm Impedance Matching. *Applied Physics Letters*, 93, 083119 (2008).
- 3) W.W. Zhou, C. Rutherglen, P.J. Burke. Wafer Scale Synthesis of Dense, Aligned Arrays of SWNTs. *Nano Research*, 1(2), 158-165 (2008).

- 4) C. Rutherglen, P.J. Burke. Carbon Nanotube Radio. *Nanoletters*, 7 (11), 3296-3299 (2007).
- 5) Dwight Woolard, Peiji Zhao, C Rutherglen, Zhen Yu, Peter Burke, Steven Brueck, Andreas Stintz. Nanoscale Imaging Technology for THz-Frequency Transmission Microscopy. *International Journal of High Speed Electronics and Systems*. 18(1) 205-222 (2008).
- 6) Zhen Yu, C. Rutherglen, P.J. Burke. Microwave Nanotube Transistor Operating at High Bias. *Applied Physics Letters*, 88 233115 (2006).
- 7) P.J. Burke, C. Rutherglen, Z. Yu. Single-Walled Carbon Nanotubes: Applications in High Frequency Electronics. *International Journal of High Speed Electronics and Systems*. 16(4) 977-999 (2008).
- 8) Shengdong Li, Zhen Yu, Christopher Rutherglen, Peter J. Burke. Electrical Properties of 0.4cm long single-walled carbon nanotube. *Nano Letters*, 4(10), 2003-2007 (2004).

Book Chapter

- 9) P.J. Burke, C. Rutherglen, Z. Yu. Single-walled Carbon Nanotubes: Applications in High Frequency Electronics in *Nanotubes and Nanowires*, Editor P.J. Burke, World Scientific, (2007).

Conference Proceedings

- 10) W.W. Zhou, C. Rutherglen, P.J. Burke. Nanotube Array Synthesis for Microwave Applications. *Proc. IEEE International Symposium on Antennas & Propagation*, (2008)
- 11) Peter J. Burke, Chris Rutherglen, and Zhen Yu. Carbon Nanotube Antennas. *Proc. SPIE Int. Soc. Opt. Eng.* 6328, 632806-1 (2006)
- 12) Zhen Yu, Chris Rutherglen, and Peter J. Burke. Scaling of the microwave and dc conductance of metallic single-walled carbon nanotubes. *Proc. SPIE Int. Soc. Opt. Eng.* 6003, 60030Q (2005)
- 13) Peter J. Burke, C. Rutherglen, Zhen Yu. Carbon Nanotube Antennas. *Proc. of 9th International Conference on Electromagnetics in Advanced Applications*, 937 (2005).
- 14) Peter J. Burke, C. Rutherglen, Zhen Yu. Carbon Nanotube Antennas. *Proc. of 9th International Conference on Electromagnetics in Advanced Applications*, 937 (2005).
- 15) Peter J. Burke, Zhen Yu, S. Li, C. Rutherglen. Nanotube Technology for Microwave Applications (invited). *Proc. of IEEE MTT International Microwave Symposium 2005*, (2005).
- 16) Zhen Yu, C. Rutherglen, S. Li, Peter J. Burke. Using ultra-long nanotubes to make identical CNT FETs. *NTSI-Nanotech 2005 Proceedings*, 3, 123 (2005).
- 17) Qing He, Ellis Meng, Yu-Chong Tai, Christopher M. Rutherglen, Jon Erickson, Jerome Pine. *Parylene Neuro-Cages for Live Neural Network Study*, The 12th International Conference on Solid State Sensors, Actuators and Microsystems, Boston MA, Jun 8-12, 2003.

AWARDS

EECS Best Paper Award, UCI

July 2008

- Carbon Nanotube Radio. *Nanoletters*

CALIT² Fellowship Award

September 2003

ACTIVITIES / INTERESTS/AWARDS

FCC General Radiotelephone Operators License (PG-GB-027994)

1996

- The holder of this license is entitled to operate, maintain and repair transmitters in the Marine, Aviation, and International Fixed Services.

FCC Amateur Radio License, Technician class (KE6WPE)

1995

Teaching Assistant (Probability Theory)

Spring 2004

Electrical Engineering, University of California, Irvine

- Served as a discussion section TA for +100 engineering students for an upper-division course in probability theory.

Teaching Assistant (Semiconductor Device Fundamentals)

Fall 2006

Electrical Engineering, University of California, Irvine

- Served as a discussion section TA for +100 engineering students for an upper-division course in semiconductor device fundamentals.

Caltech Baseball Team

1998-2001