

Robert J. Walters, PhD

Caltech M/S 128-95
Pasadena, CA 91125

rwalters @ caltech . edu

Tel: (626) 395-2193
Fax: (626) 844-9320

<http://rwalters.caltech.edu>

Research Interests:

Optoelectronics research from many perspectives:

1. Fundamentals, including relevant physics and materials issues
2. Conceptual modeling, including information theory, simulation, and associated methods
3. Device applications, particularly in communication and computer technology
4. Experimental design, emphasizing automated data collection and processing

Education:

Ph.D. Applied Physics, California Institute of Technology, Pasadena, CA, May 2007

Thesis: *Silicon Nanocrystals for Silicon Photonics*

M.S. Applied Physics, California Institute of Technology, Pasadena, CA, June 2003

B.S. Physics, Harvey Mudd College, Claremont, CA, May 2001

Optoelectronics Publications:

"Silicon nanocrystal field-effect light-emitting devices," *IEEE Journal of Selected Topics in Quantum Electronics: Silicon Photonics*, **12** (6-2), 1647 – 1656 (2006)

R. J. Walters, J. Carreras, T. Feng, L. D. Bell, and H. A. Atwater [Invited Contribution]

"Photoluminescence quantum efficiency of dense silicon nanocrystal ensembles in SiO₂," *Physical Review B*, **73**, 132302 (2006)

R. J. Walters, J. Kalkman, A. Polman, H. A. Atwater, and M. J. A. de Dood

"Field-effect electroluminescence in silicon nanocrystals," *Nature Materials*, **4** (2), 143-146 (2005)

R. J. Walters, H. A. Atwater, and G. I. Bourianoff

"Silicon optical nanocrystal memory," *Applied Physics Letters*, **85** (13), 2622-2624 (2004)

R. J. Walters, P. G. Kik, J. D. Casperson, H. A. Atwater, R. Lindstedt, M. Giorgi, and G. Bourianoff

"Determination of energy barrier profiles for high-k dielectric materials utilizing bias-dependent internal photoemission," *Applied Physics Letters*, **85** (18), 4134-4136 (2004)

J. D. Casperson, R. J. Walters, L. D. Bell, D. B. Farmer, R. G. Gordon, H. A. Atwater

"Nanocrystal research targets optoelectronic components," *Laser Focus World*, **40** (9), (9/2004).

R. J. Walters, J. S. Biteen, G. I. Bourianoff, and H. A. Atwater

Patents:

1. "Sequentially Charged Nanocrystal Light Emitting Device" (Filed 4/6/05, #11/100,807)
H. A. Atwater, R. J. Walters
2. "Nanocrystal Based High-Speed Electro-Optic Modulator," (U.S. #6,771,410)
G. Bourianoff, R. Lindstedt, H. A. Atwater, M. Giorgi, R. J. Walters, J. D. Casperson, P. G. Kik
3. "Electro-Optical Nanocrystal Memory Device," (U.S. #7,121,474)
G. Bourianoff, R. Lindstedt, H. A. Atwater, M. Giorgi, R. J. Walters, J. D. Casperson, P. G. Kik

Conference Presentations:

- 4/2007 MRS Spring Meeting, San Francisco, CA
Simulating Light Emission in Silicon Nanocrystal Field Effect Light Emitting Devices [Poster]
- 1/2007 SPIE Photonics West, San Jose, CA
Field Effect Light Emitting Devices (FELEDs) [Invited Contribution]
- 4/2006 MRS Spring Meeting, San Francisco, CA
Silicon Nanocrystals in Field Effect Light Emitting Devices (FELEDs) [Award Presentation]
PbSe Nanocrystal Excitation by a Silicon Nanocrystal Field Effect Light Emitting Device
- 12/2005 MRS Fall Meeting, Boston, MA
Field Effect Electroluminescence in Silicon Nanocrystal Arrays
Photoluminescence Quantum Efficiency of Dense Silicon Nanocrystal Ensembles in SiO₂ [Poster]
Electroluminescent Device based on Energy Transfer from Si Nanocrystals to PbSe Nanocrystals [Poster]
- 8/2005 SPIE Nanophotonics, San Diego, CA
Silicon Nanocrystal Field Effect Light Emitting Device (FELED) [Invited Contribution]
- 5/2005 APS March Meeting, Los Angeles, CA
Silicon Nanocrystal Field Effect Light Emitting Device (FELED)
Silicon Nanocrystal Internal Quantum Efficiency via Local Optical Density of States
- 5/2004 E-MRS Spring Meeting, Strasbourg, France
Erbium Doped Silicon Nanocrystal Optical Memory
- 4/2004 MRS Spring Meeting, San Francisco, CA
Silicon Nanocrystal Optical Modulator [Invited Contribution]
- 12/2003 MRS Fall Meeting, Boston, MA
Reading and Programming a Silicon Nanocrystal Optical Memory
- 4/2003 MRS Spring Meeting, San Francisco, CA
Silicon Optical Nanocrystal Memory
- 11/2002 MRS Fall Meeting, Boston, MA
Optical Nanocrystal Memory

Honors and Fellowships:

Demetriades-Tsafka Thesis Prize in Nanotechnology (2007)
Materials Research Society Graduate Student Award (Silver; Spring 2006)
Intel Foundation Fellowship (2005-2007)
National Defense Science and Engineering Graduate Fellowship (2001-2004)

Robotics Publications:

(Published as a member of The Golem Group LLC, a three time competitor in DARPA Grand Challenge autonomous land vehicle events. My contributions pertain primarily to local trajectory planning algorithms.)

"The Golem Group/University of California at Los Angeles Autonomous Ground Vehicle in the DARPA Grand Challenge," *Journal of Field Robotics*, **23** (8), 527–553 (2006)
R. Mason, et al.

"Autonomous Off-Road Driving in the DARPA Grand Challenge," *Proceedings of the IEEE: ION Position, Location, and Navigation Symposium, April 25-27 2006*, 366–371 (2006)
E. Jones, et al.