

Arvind P. Ravikumar

CONTACT INFORMATION

Dept. of Energy Resources Engineering
Stanford University
Green Earth Sciences 050
367 Panama St.
Stanford, CA 94305-2220

Email: arvindr@stanford.edu
Voice: (650) 736-3491
Fax: (650) 725-2099
WWW: <http://www.arvindravikumar.com>
CV Date: 15 September, 2016

CURRENT POSITION

Post-doctoral Fellow, Department of Energy Resources Engineering, Stanford University

EDUCATION

Ph.D. (2015), Electrical Engineering, Princeton University, Princeton NJ 08544

- Minor: Energy and Climate Policy, Woodrow Wilson School of Public Policy and International Affairs
- Dissertation title: II-VI Materials based high performance intersubband devices
- Advisor: Claire F. Gmachl

M.Sc. (Honors) (2010), Physics, Birla Institute of Technology and Science, Pilani, India

B.E. (Honors) (2010), Electrical Engineering, Birla Institute of Technology and Science, Pilani, India

EMPLOYMENT HISTORY

- 2015- Present: Post-doctoral Fellow Department of Energy Resources Engineering, Stanford University
- 2014-2015: Senior Fellow, McGraw Center for Teaching and Learning, Princeton University
- 2014: Graduate intern, Sandia National Laboratories, Albuquerque, NM
- 2013-2015: Fellow, Princeton Climate and Energy Scholars, Princeton Environmental Institute, Princeton University
- 2012-2015: Teaching Assistant, Princeton University
- 2011-2015: Graduate Student Researcher, Princeton University
- 2010: Undergraduate research fellow, Tata Institute of Fundamental Research, Mumbai, India

TEACHING AND MENTORING

- **Department of Energy Resources Engineering, Stanford University**
 - 2015–2016: Mentor, Summer Undergraduate Research in Geoscience and Engineering (SURGE) program, Stanford Earth Summer Undergraduate Research (SESUR) program, Summer Undergraduate Program on Energy Research (SUPER) (3 students)
- **Department of Electrical Engineering, Princeton University**
 - 2012–2014: Lead Teaching Assistant, ELE 208 - Electronic Materials and Devices
 - 2011–2014: Mentor, MIRTHER Research Experience for Undergraduates (REU) summer program, Princeton University (8 students)
 - 2012–2015: Mentor, Junior independent work, Electrical Engineering, Princeton University (2 students)
 - 2014–2015: Mentor, Senior thesis, Electrical Engineering, Princeton University (1 student)
 - 2011–2015: Volunteer at various science outreach activities at local science festivals and high schools
- **McGraw Center for Teaching and Learning, Princeton University**
 - 2014–2015: Senior graduate teaching fellow
 - 2014–2015: Led University-wide training for new graduate assistants in instruction

LEADERSHIP AND
PROFESSIONAL
SERVICE

- 2016: Rising Environmental Leaders Program, Woods Institute for the Environment, Stanford University
- 2016: Facilitator, Management Matters workshop, Vice-Provost for Graduate Education, Stanford University
- 2015–Present: Associate Editor, [Highwire Earth](#), Princeton University
- 2015: Committee Member, President’s task force on diversity, inclusion and equity, Princeton University
- 2014–2015: Executive committee, Council of the Princeton University Community
- 2012–2014: Steering committee member, Princeton Institute for the Science and Technology of Materials (PRISM) cleanroom user committee, Princeton University
- 2012: Organizing committee, 12th international conference intersubband transitions in quantum wells (ITQW), Lake George, NY
- 2011–2012: Graduate student council, Department of Electrical Engineering, Princeton University

GRANTS AND
AWARDS

- 2014: \$50,000 National Science Foundation grant for student-led independent project (SLIP).
- 2014: Newport graduate award in photonics, Princeton University.
- 2014: Outstanding teaching award, Department of Electrical Engineering, Princeton University.
- 2014: Graduate teaching fellowship, McGraw Center for Teaching and Learning, Princeton University.
- 2013: III-place, 8th Annual Innovation Forum, Keller Center for Innovation, Princeton University.
- 2010: Princeton University engineering fellowship.
- 2010: Best outgoing student, Department of Physics, BITS-Pilani.
- 2010: R.S.C. best undergraduate research award, BITS-Pilani.

ACADEMIC AND
PROFESSIONAL
MEMBERSHIPS

- American Geophysical Union
- Optical Society of America
- American Physical Society

AD-HOC JOURNAL
REVIEW

- Applied Physics Letters
- Journal of Applied Physics
- Optics Letters
- Optics Express
- Laser and Photonics Reviews
- Progress in Photovoltaics: Research and Applications
- Infrared Physics and Technology

PATENTS

1. A.P. Ravikumar, M.C. Tamargo, A. Shen, and C. Gmachl (2014). II-VI materials based short and long wave Quantum Well Infrared Photodetectors. **US 14/185,404**, February 2014.

GOOGLE SCHOLAR
STATISTICS

- Google scholar statistics as of August 21st, 2016
- Citations = 121
 - h-index = 7
 - i10-index = 6

- 16 **Ravikumar, A.P.**, Brandt, A.R. (2016). An effective policy framework to mitigate distributed emissions: the case of methane. In review: *Nature Energy*.
- 15 **Ravikumar, A.P.**, Wang, K., Brandt, A.R. (2016). Are optical gas imaging technologies effective for methane leak detection? In review: *Environmental Science & Technology*.
- 14 **Ravikumar, A.P.**, Sivco, D., Gmachl, C.F. (2016). Wavelength independent normal-incidence detection for intersubband infrared detectors. In review: *Optics Express*.
- 13 Kemp, C.E., **Ravikumar, A.P.**, Brandt, A.R. (2016) **Comparing natural gas leakage detection technologies using an open-source virtual gas field simulator**. *Environmental Science & Technology* **40** 4546.
- 12 Garcia, T.A., **Ravikumar, A.P.**, Tamargo, M.C., Gmachl, C.F. (2016) **II-VI quantum cascade emitters in the 6-8 μm range**. *Physica Status Solidi B* **253** 1494.
- 11 Chen, G., Kaya, Y., **Ravikumar, A.P.**, Tamargo, M.C., Gmachl, C.F. (2015) **Growth and characterization of ZnCdSe/ZnCdMgSe two-color quantum well infrared photodetectors**. *Physica Status Solidi C* **13** 673.
- 10 **Ravikumar, A.P.**, De Jesus, J., Tamargo, M.C., Gmachl, C.F. (2015) **II-VI based mid-infrared broadband Quantum Cascade detector**. *Applied Physics Letters* **107** 141105.
- 9 Wolf, O., Campione, S., Benz, A., **Ravikumar, A.P.**, Liu, S., Kadlec, E.A., Shaner, E.A., Klem, J.F., Sinclair, M.B., Brener, I. (2015) **Phased-array sources based on non-linear metamaterial nanocavities**. *Nature Communications* **6** 7667.
- 8 **Ravikumar, A.P.**, Garcia, T.A., De Jesus, J., Tamargo, M.C., Gmachl, C. (2014) **High detectivity short wavelength II-VI Quantum Cascade Detector**. *Applied Physics Letters* **105** 051113.
- 7 **Ravikumar, A.P.**, Chen, G., Zhao, K., Tian, Y., Prucnal, P., Tamargo, M.C., Gmachl, C.F., Shen, A. (2013) Room temperature and high responsivity II-VI short wavelength quantum well infrared photodetector. *Applied Physics Letters* **102** 161107.
- 6 Shen, A., **Ravikumar, A.P.**, Chen, G., Zhao, K., Alfaro-Martinez, A., Garcia, T., De Jesus, J., Tamargo, M.C., Gmachl, C. (2013) **MBE growth of ZnCdSe/ZnCdMgSe quantum-well infrared photodetectors**. *Journal of Vacuum Science & Technology B* **31** 03C113.
- 5 De Jesus, J., Garcia, T.A., Dhomkar, S., **Ravikumar, A.P.**, Gmachl, C., Shen, A., Ferizovic, D., Munoz, M., Tamargo, M.C. (2013) **Characterization of three-well active region of a quantum cascade laser using contactless electroreflectance**. *Journal of Vacuum Science & Technology B* **31** 03C134.
- 4 Garcia, T.A., Hong, S., Gao, Y., Tamargo, M., De Jesus, J., Deligiannakis, V., **Ravikumar, A.P.**, Gmachl, C., Shen, A. (2013) **Improved electrical properties and crystalline quality of II-VI heterostructures for quantum cascade lasers**. *Journal of Vacuum Science & Technology B* **31** 03C133.
- 3 **Ravikumar, A.P.**, Alfaro-Martinez, A., Chen, G., Zhao, K., Tamargo, M.C., Gmachl, C.F., Shen, A. (2012) **ZnCdSe/ZnCdMgSe quantum well infrared photodetector**. *Optics Express* **20** 22391.
- 2 Dhara, S., Solanki, H.S., **Ravikumar, A.P.**, Singh, V., Sengupta, S., Chalke, B.A., Dhar, A., Gokhale, M., Bhattacharya, A., Deshmukh, M.M. (2011) **Tunable thermal conductivity in defect engineered nanowires at low temperatures**. *Physical Review B* **84** 121307.
- 1 Dhara, S., Sengupta, S., Solanki, H.S., Maurya, A., **Ravikumar, A.P.**, Gokhale, M.R., Bhattacharya, A., Deshmukh, M.M. (2011) **Facile fabrication of lateral nanowire wrap-gate devices with improved performance**. *Applied Physics Letters* **99** 173101.

PEER-REVIEWED
TECHNICAL
REPORTS

1. **Ravikumar, A.P.**, Chou, C., Jhaveri, J., Baldwin, J., Hanna, P., Keller, K., Peng, W., Rabin, S., Trierweiler, A., Wang, T., Socolow, R. (2016) **Nuclear energy from magnetic confinement fusion** *Energy Technology Distillate Series* Andlinger Center for Energy and the Environment, Princeton University.

CONFERENCE
PRESENTATIONS

- 31 **A.P. Ravikumar**, J. Wang, and A.R. Brandt (2016). Is optical gas imaging effective for detecting fugitive methane emissions? A technological and policy perspective. Submitted: *American Geophysical Union Fall Meeting*, San Francisco CA, December 2016.
- 30 J. Jagdeo, **A.P. Ravikumar**, E. Grubert, and A. R. Brandt (2016). A Holistic Assessment of Energy Production: Environmental, Economic, and Social Impacts of Hydraulic Fracturing in Williams County, North Dakota. Submitted: *American Geophysical Union Fall Meeting*, San Francisco CA, December 2016.
- 29 Y. Kaya, **A.P. Ravikumar**, G. Chen, A. Shen, M.C. Tamargo, and C. Gmachl (2016). Absolute temperature sensing by a two-color ZnCdSe/ZnCdMgSe detector. *U.S. Workshop on the Physics and Chemistry of II-VI materials*, Baltimore MD, October 2016.
- 28 Y. Kaya, **A.P. Ravikumar**, G. Chen, M.C. Tamargo, A. Shen, and C. Gmachl (2016). Multi-leads, two-color ZnCdSe/ZnCdMgSe based quantum well infrared photodetectors. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, June 2016.
- 27 Y. Kaya, **A.P. Ravikumar**, G. Chen, M.C. Tarmargo, A. Shen, and C. Gmachl (2016). Multi-terminal two-color ZnCdSe/ZnCdMgSe based quantum well infrared photodetector. *American Physical Society March Meeting*, Baltimore MD, March 2016.
- 26 J. De Jesus, T.A. Garcia, **A.P. Ravikumar**, C.F. Gmachl, and M. C. Tamargo (2015). II-VI semiconductor based broadband Quantum Cascade Detectors. *North American Conference on Molecular Beam Epitaxy (NAMBE)*, Riviera Maya, Mexico, October 2015.
- 25 J. De Jesus, T.A. Garcia, **A.P. Ravikumar**, C.F. Gmachl, and M.C. Tamargo (2015). II-VI broadband quantum cascade detectors. *17th International Conference on II-VI compounds and Related Materials (II-VI 2015)*, Paris, France, September 2015.
- 24 G. Chen, **A.P. Ravikumar**, T. Garcia, J. De Jesus, M. C. Tamargo, C. Gmachl, and A. Shen (2015). Growth and characterization of ZnCdSe/ZnCdMgSe two-color quantum well infrared photodetectors. *17th International Conference on II-VI compounds and Related Materials (II-VI 2015)*, Paris, France, September 2015.
- 23 **A.P. Ravikumar**, T.A. Garcia, J. De Jesus, M.C. Tamargo, and C. Gmachl (2015). Long wave, room temperature II-VI based Quantum Cascade emitters. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, June 2015.
- 22 O. Wolf, S. Campione, A. Benz, **A.P. Ravikumar**, S. Liu, E.A. Kadlec, E. Shaner, J.F. Klem, M.B. Sinclair, and I. Brener (2015). Coherent second harmonic generation in a quantum well metasurface coupled system. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, June 2015.
- 21 O. Wolf, S. Campione, A. Benz, **A.P. Ravikumar**, S. Liu, E.A. Kadlec, E.A. Shaner, J.F. Klem, M.B. Sinclair, and I. Brener (2015). Fully customizable light sources based on second harmonic generation in a quantum well-metasurface coupled system. *Materials Research Society Spring Meeting*, San Francisco CA, April 2015.
- 20 **A.P. Ravikumar**, T.A. Garcia, J. De Jesus, M. Tamargo and C. Gmachl (2014). II-VI based broadband infrared photodetector. *US Workshop on the Physics and Chemistry of II-VI materials*, Baltimore MD, October 2014.
- 19 M. C. Tamargo, T. A. Garcia, J. De Jesus, G. Chen, V. Deligianakis, **A. P. Ravikumar**, C. Gmachl, and A. Shen (2014). Progress in wide bandgap II-VI materials for intersubband devices: Quantum Cascade Detectors. *18th International Conference on Molecular Beam Epitaxy*, Flagstaff AZ, September 2014.

- 18 **A.P. Ravikumar**, G. Chen, T.A. Garcia, J. De Jesus, A. Shen, M. Tamargo, and C. Gmachl (2014). II-VI materials based intersubband infrared detectors. *Quantum Structured Infrared Photodetector International Conference (QSIP 2014)*, Sante Fe NM, July 2014.
- 17 **A.P. Ravikumar**, T.A. Garcia, J. De Jesus, M.C. Tamargo, and C. Gmachl (2014). High detectivity short wavelength II-VI Quantum Cascade Detector. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, June 2014.
- 16 **A.P. Ravikumar**, G. Chen, J. De-Jesus, T. Garcia, M.C. Tamargo, A. Shen, and C. Gmachl (2013). High performance II-VI ZnCdSe/ZnCdMgSe based Quantum Cascade detectors. *12th International Conference on Intersubband Transitions in Quantum Wells (ITQW 2013)*, Bolton Landing NY, September 2013.
- 15 J. De Jesus, T.A. Garcia, S. Dhomkar, **A.P. Ravikumar**, C.F. Gmachl, A. Shen, and M. C. Tamargo (2013). Use of contactless electroreflectance and modeling techniques to characterize intersubband devices. *12th International Conference on Intersubband Transitions in Quantum Wells (ITQW 2013)*, Bolton Landing NY, September 2013.
- 14 T.A. Garcia, J. De Jesus, **A.P. Ravikumar**, S. Hong, V. Deligiannakis, C.F. Gmachl, A. Shen, and M.C. Tamargo (2013). Growth interruptions in MBE grown II-VI heterostructures for quantum cascade devices. *12th International Conference on Intersubband Transitions in Quantum Wells (ITQW 2013)*, Bolton Landing NY, September 2013.
- 13 **A.P. Ravikumar**, J. De-Jesus, T. Garcia, A. Shen, M.C. Tamargo, and C. Gmachl (2013). ZnCdSe/ZnCdMgSe based mid-infrared quantum cascade emitters. *16th International Conference on II-VI compounds and Related Materials (II-VI 2013)*, Nagahama, Japan, September 2013.
- 12 **A. P. Ravikumar**, A. Shen, G. Chen, K. Zhao, Y. Tian, P. Prucnal, M. Tamargo, and C. Gmachl (2013). High performance quantum-well infrared photodetectors made from wide band-gap II-VI semiconductors. *16th International Conference on II-VI compounds and Related Materials (II-VI 2013)*, Nagahama, Japan, September 2013.
- 11 **A.P. Ravikumar**, G. Chen, K. Zhao, Y. Tian, P. Prucnal, M. Tamargo, C.F. Gmachl, and A. Shen (2013). Room temperature and high responsivity short wavelength II-VI quantum well infrared photodetector. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, June 2013.
- 10 **A.P. Ravikumar**, G. Chen, K. Zhao, Y. Tian, P. Prucnal, M. Tamargo, C.F. Gmachl, and A. Shen (2013). High performance II-VI mid-wave quantum well infrared photodetector. *International Symposium on Photoelectronic Detection and Imaging (ISPDI)*, Beijing, China, June 2013.
- 9 J. De Jesus, T.A. Garcia, S. Dhomkar, **A.P. Ravikumar**, C.F. Gmachl, M.C. Tamargo, and A. Shen (2013). Contactless electroreflectance characterization of a triple asymmetric coupled quantum well active region of a ZnCdMgSe-based quantum cascade laser. *American Physical Society March Meeting*, Baltimore MD, March 2013.
- 8 T.A. Garcia, J. De Jesus, **A.P. Ravikumar**, M.C. Tamargo, C.F. Gmachl, and A. Shen (2013). Material improvements of ZnCdSe/ZnCdMgSe heterostructures for quantum cascade laser applications with incorporation of growth interruptions during MBE growth. *American Physical Society March Meeting*, Baltimore MD, March 2013.
- 7 A. Shen, **A.P. Ravikumar**, A. Alfaro-Martinez, G. Chen, K. Zhao, T. Garcia, J. De Jesus, M.C. Tamargo, and C. Gmachl (2012). MBE growth of ZnCdSe/ZnCdMgSe quantum well infrared photodetectors. *North American Conference on Molecular Beam Epitaxy (NAMBE)*, Atlanta GA, October 2012.
- 6 T.A. Garcia, J. De Jesus, S. Dhomkar, R. Moug, **A.P. Ravikumar**, V. Deligiannakis, C. Gmachl, and M. Tamargo (2012). Improvements in electrical properties and crystalline quality of ZnCdSe/ZnCdMgSe heterostructures for quantum cascade laser applications. *North American Conference on Molecular Beam Epitaxy (NAMBE)*, Atlanta GA, October 2012.

- 5 J. De Jesus, T.A. Garcia, S, Dhomkar, **A.P. Ravikumar**, C. Gmachl, and M.C. Tamargo (2012). Characterization of quantum cascade laser active regions using contactless electroreflectance. *North American Conference on Molecular Beam Epitaxy (NAMBE)*, Atlanta GA, October 2012.
 - 4 **A.P. Ravikumar**, Joel de Jesus, Thor Garcia, Peter Taylor, Samantha Essig, Heather Sandfort, Aidong Shen, Maria Tamargo, and Claire Gmachl (2012). II-VI short wavelength intersubband devices. *International Quantum Cascade Laser School and Workshop (IQCLSW)*, Vienna, Austria, September 2012.
 - 3 **A.P. Ravikumar**, Adrian Alfaro-Martinez, Guopeng Chen, Kuaile Zhao, Maria C. Tamargo, Claire Gmachl and Aidong Shen (2012). A II-VI quantum well infrared photodetector. *Conference on Lasers and Electro-Optics (CLEO)*, San Jose CA, May 2012.
 - 2 **A.P. Ravikumar**, A. Alfaro-Martinez, G. Chen, K. Zhao, M.C. Tamargo, C. Gmachl and A. Shen (2012). A II-VI quantum well infrared photodetector. *Consortium for Spectroscopic Sensor Systems (CoS3) Spring workshop*, Princeton NJ, April 2012.
 - 1 **A.P. Ravikumar**, and C. Gmachl, (2011) Developing eyes for the mid-infrared: From missile trackers to breath analyzers. *Princeton Research Symposium*, Princeton NJ, November 2011.
-
1. **A.P. Ravikumar**, G. Chen, J. de-Jesus, T. Garcia, M.C. Tamargo, A. Shen, and C. Gmachl (2013). High performance II-VI ZnCdSe/ZnCdMgSe based intersubband infrared detectors. *US Workshop on the Physics and Chemistry of II-VI materials*, Chicago IL, October 2013.

INVITED
TALKS