

PRASHANT NAGPAL

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University of Colorado at Boulder
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Professional Experience:

- 2018-Present** *Co-Founder, Antimicrobial Regeneration Consortium (ARC, amrconsortium.org).*
- 2012-Present** *Assistant Professor, Department of Chemical and Biological Engineering, Materials Science and Engineering, BioFrontiers Institute, & Renewable and Sustainable Energy Institute (RASEI), University of Colorado at Boulder.*
- 2014-2016** *Founder, PRAAN Biosciences, Startup company co-founded by Nagpal and Chatterjee lab at University of Colorado, Boulder.*
- 2010-2012** *Postdoctoral Fellow, Center for Advanced Solar Photophysics, Los Alamos National Laboratory. Advisor: Victor I. Klimov.*
- 2004-2009** *Doctor of Philosophy, Chemical Engineering, University of Minnesota, Advisor: David J. Norris.*
- 2000-2004** *Bachelor of Technology, Chemical Engineering, Indian Institute of Technology (I.I.T.) Delhi, Advisor: Ashok N. Bhaskarwar.*

Selected Awards and Honors:

- 2018** **co-Founder, Antimicrobial Regeneration Consortium (ARC)**
- 2018** **Emerging Leader in Biological Engineering, BMC-Springer Nature, Journal of Biological Engineering**
- 2017** **Outstanding Junior Faculty Award, University of Colorado Boulder**
- 2015** **Dean's Faculty Fellowship, University of Colorado Boulder**
- 2015-17** **W.M. Keck Foundation Research Award**
- 2014-2016** **Founder, PRAAN Biosciences**
- 2014-19** **NSF CAREER Award**
- 2013** **New Inventor of Year, University of Colorado Boulder**
- 2012-** **Elected to Sigma Xi Scientific Research Society**
- 2011-** **Topical Chair, American Institute of Chemical Engineers (AIChE) Annual Meeting**
- 2009** **Materials Research Society (MRS) Gold Student Award, Fall MRS Meeting, Boston.**
- 2008-09** **Doctoral Dissertation Fellowship, University of Minnesota.**
- 2001-03** **Awarded Merit Scholarship for 4 out of 8 semesters for highest GPA in Chemical Engineering, I.I.T Delhi.**

- 1997, 1999** Awarded Merit Certificate in Computer Science and Mathematics for being among the top **0.1%** of **400,000** students.
- 1997, 1999** **National Scholarship** awarded by the Government of India.

Peer Reviewed Publications:

After Joining University of Colorado Boulder:

45. “Nucleotide and structural label identification in single RNA molecules with quantum tunneling spectroscopy”,
Abel G.A., Korshoj L.E., Otoupal P.B., Khan S. K., Chatterjee A., Nagpal P.*, **Chemical Science**, DOI: 10.1039/C8SC03354D (2018).
44. “Assessing different reactive oxygen species as potential antibiotics: Selectivity of intracellular superoxide generation using quantum dots”,
Levy M., Courtney C.M., Chowdhury P.P., Ding Y., Grey E.L., Goodman S.M., Chatterjee A., Nagpal P.*, **ACS Applied BioMaterials**, 1, 529 (2018).
43. “Designing superoxide-generating quantum dots for selective light-activated nanotherapy”,
Goodman S.M., Levy M., Li F.F., Ding Y., Courtney C.M., Chowdhury P.P., Erbse A., Chatterjee A., Nagpal P.*, **Frontiers in Chemistry**, 6, 46 (2018). **Invited Article**
42. “High-throughput block optical DNA sequence identification”,
Sagar D.M., Korshoj L.E., Hanson K.B., Chowdhury P.P., Otoupal P.B., Chatterjee A., Nagpal P.*, **Small**, 14, 1703165 (2018).

Invention highlighted by: University of Colorado Press Release

Press: Phys.Org, Health Unlocked, Global News Connect, Buffzone, NewsWise, Health & Medicine News, Science Daily

41. “Conformational smear characterization and binning of single-molecule conductance measurements for enhanced molecular recognition”,
Korshoj L.E., Afsari S., Chatterjee A., Nagpal P.*, **Journal of the American Chemical Society**, 139, 15420 (2017).

Invention highlighted by: University of Colorado Press Release

Press: Phys.Org, Health Unlocked, Global News Connect, Buffzone, NewsWise, Health & Medicine News, Science Daily

40. “Quantum point contact single-nucleotide conductance for DNA and RNA sequence identification”,
Afsari S., Korshoj L.E., Abel G.R., Khan S., Chatterjee A., Nagpal P.*, **ACS Nano**, 11, 11169 (2017).

Invention highlighted by: University of Colorado Press Release

Press: Phys.Org, Health Unlocked, Global News Connect, Buffzone, NewsWise, Health & Medicine News, Science Daily

39. “*Potentiating antibiotics in drug-resistant clinical isolates via stimuli-activated superoxide generation*”, Courtney C.M., Goodman C.M., Nagy T., Levy M., Madinger N., Detweiler C., Nagpal P.*, Chatterjee A.*, *Science Advances*, 3, e1701776 (2017). (Impact Factor: Not Available)

Newsweek, MSN, and BBC covered the discovery

Invention highlighted by: University of Colorado Press Release, Newsweek, MSN, International Business Times, BBC

Press: IEEE Spectrum, Phys.Org, EurekAlert, Science Daily, Nanowerk, AzoNano , Center for Infectious Disease Research and Policy, ResearchGate , AzoNano , NanotechWeb, Technology.Org, Science Alert, NewsWise , LongRoom, Drug Discovery and Development, Science News, News Medical

38. “*Photon upconversion towards applications in energy conversion and bioimaging*”, Sun Q., Ding Y., Sagar D.M., Nagpal P.*, *Progress in Surface Science*, 92, 281, (2017). ***Invited Review***
37. “*ROS mediated selection for increased NADPH availability in Escherichia coli*”, Reynolds T.S., Courtney C.M., Erickson K.E., Wolfe L.M., Chatterjee A., Nagpal P., Gill R.T.*, *Biotechnology and Bioengineering*, 114, 2685 (2017).
36. “*Titanium dioxide nanotube membranes for solar energy conversion: effect of deep and shallow dopants*”, Ding Y., Nagpal P.*, *Physical Chemistry Chemical Physics*, 19, 100423 (2017). (Impact Factor: 4.123)
35. “*Single nucleobase identification using biophysical signatures from nanoelectronic quantum tunneling*”, Korshoj L.E., Afsari S., Khan S., Chatterjee A.*, Nagpal P.*, *Small*, 13, 1603033 (2017).
34. “*Standalone anion- and co-doped titanium dioxide nanotubes for photocatalytic and photoelectrochemical solar-to-fuel conversion*”, Ding Y., Nagpal P.*, *Nanoscale*, 8, 17496 (2016).
33. “*Split-Wedge Antennas with Sub-5 nm Gaps for Plasmonic Nanofocusing*”, Chen X., Lindquist N.C., Klemme D.J., Nagpal P., Norris D.J., Oh S.H., *Nano Letters*, 16, 7849 (2016).

32. “*Observation of thermal beaming from tungsten and molybdenum bull’s eye*”, Park J.H., Han S.E., Nagpal P., Tischler J.G., Norris D.J., *ACS Photonics*, 3, 494 (2016).

31. “*Photoexcited quantum dots for killing multidrug-resistant bacteria*”, Courtney C.M., Goodman S.M., McDaniel J.A., Madinger N.E., Chatterjee A.*, Nagpal P.*, *Nature Materials*, 15, 529 (2016).

ABC NEWS Denver Channel 7 Evening News, France 24, and Voice of America covered the discovery

National Science Foundation News Highlight

Invention highlighted by: University of Colorado Press Release , Huffington Post , Daily Mail , Boston Global Media-Stat , Yahoo News , Popular Mechanics , Times of India , Zee News , Big News Network , France 24, Voice of America, ChBE Highlight

Press: Science Daily , EurekAlert , Science Alert , Phys Org , Genetic Engineering and Biotechnology News , Photonics.Com , Science Newline , News Wise , News Headline Spot , e Science News , Tech News Now , WN.com , Quantum Times , Compound Semiconductor , Jersey Tribune , Controlled Environments , Infection Control Today , Scicasts , Nanotechnology Now , British Society of Nanomedicine , Nanowerk , Innovation Toronto , ZME Science , Inverse , ScienMag , The Medical News , Tech Times , Business Standard , IndiaNewEngland , GizMag , BGR , RT , Medical Daily

International News Coverage: Indian Media Times of India Frontier Mail World News 24X7 , Zee News , MedIndia , Insights on India , DaijiWorld , Canadian Media CanIndiaNews , British Media Daily Mail , Spanish Media Lainformacion elEconomista.es Quo.es , Australian Media Big News Network , Russian Media ACLP.ru , Armenian Media NEWS.am , German Media Trendsderzukunft

30. “*Long range energy transfer in self-assembled quantum dot-DNA cascades*”, Goodman S.M., Siu A., Singh V., Nagpal P.*, *Nanoscale*, 7, 18435 (2015).

29. “*Air-gating and chemical-gating in transistors and sensing devices made from hollow TiO₂ semiconductor nanotubes*”, Alivov Y., Funke H., Nagpal P.*, *Nanotechnology*, 26, 295203 (2015).

28. “*Measurements of Single Nucleotide Electronic States as Nanoelectronic Fingerprints for Identification of DNA Nucleobases, Their Protonated and Unprotonated States, Isomers, and Tautomers*”, Ribot J.C., Chatterjee A.*, Nagpal P.*, *The Journal of Physical Chemistry B*, 119, 4968 (2015).

27. “*Charge transport through exciton shelves in cadmium chalcogenide quantum dot-DNA nano-bioelectronic thin films*”,

Goodman S.M., Noh H., Singh V., Cha J.N., Nagpal P.*, *Applied Physics Letters*, 106, 083109 (2015).

26. “Air-pressure tunable depletion width, rectification behavior, and charge conduction in oxide nanotubes”,
Alivov Y., Hans H., Singh V., Nagpal P.*, *ACS Applied Materials and Interfaces*, 7, 2153 (2015).
25. “Titanium-dioxide homojunction p-n diode”,
Alivov Y., Ding Y., Singh V., Nagpal P.*, *Applied Physics Letters*, 105, 263501 (2014).
24. “Low exciton-phonon coupling, high charge carrier mobilities, and multiexciton properties in two-dimensional (2D) lead, cadmium, silver, and copper chalcogenide nanostructures”,
Ding Y., Singh V., Goodman S.M., Nagpal P.*, *The Journal of Physical Chemistry Letters*, 5, 4291 (2014).
23. “Multiple energy exciton shelves in quantum dot-DNA nano-bioelectronics”,
Goodman S., Singh V., Ribot J.C., Chatterjee A., Nagpal P.*, *The Journal of Physical Chemistry Letters*, 5, 3909 (2014).
22. “Pseudo-direct bandgap transitions in silicon nanocrystals: effect on optoelectronics and thermoelectrics”,
Singh V., Yu Y., Sun Q., Korgel B., Nagpal P.*, *Nanoscale*, 6, 14643 (2014).
21. “Copper plasmonics and catalysis: Role of electron-phonon interactions in dephasing localized surface plasmons ”,
Sun Q., Ding Y., Goodman S., Funke H., Nagpal P.*, *Nanoscale*, 6, 12450 (2014).
20. “Doping of Wide-Bandgap Semiconductor Nanotubes: Optical, Electronic and Magnetic Dopants”,
Alivov Y., Singh V., Ding Y., Cerkovnik L.J., Nagpal P.*, *Nanoscale*, 6, 10839 (2014).
19. “Transparent conducting oxide nanotubes”,
Alivov Y., Singh V., Ding Y., Nagpal P.*, *Nanotechnology*, 25, 385202 (2014).

Paper highlighted as **Publishers Pick by Institute of Physics (IOP)**.

Paper selected as **IOP Select** (freely available for a year and included in a special collection of the highest quality work published across IOP journals).

Press: **NanotechWeb** from **Institute of Physics, Tech Transfer Office** Press Release.

18. “Effect of plasmon-enhancement on photophysics in upconverting nanoparticles”,
Sun Q., Ribot J.C., Singh V., Mundoor, H., Smalyukh I.I., Nagpal P.*, *Optics Express*, 22, 11516 (2014).

17. “*Photocatalysis deconstructed: design of a new catalysts for artificial photosynthesis*”, Singh V., Beltran I.J.C., Ribot, J.C., Nagpal P.*, ***Nano Letters***, 14, 597 (2014).
16. “*Direct conjugation of DNA to quantum dots for scalable assembly of photoactive thin films*”, Noh H., Goodman S., Mohan P., Goodwin A.P., Nagpal P., Cha J.N.*, ***RSC Advances***, 4, 8064 (2014).
15. “*Plasmon-enhanced energy transfer for improved upconversion of infrared radiation in doped lanthanide nanocrystals*”, Sun Q., Mundoor, H., Ribot J.C., Singh V., Smalyukh I.I., Nagpal P.*, ***Nano Letters***, 14, 101 (2014).

Paper highlighted in **Nature Materials**.

Press: **Hispanic Business, Vertical News, Journal of Visualized Experiments (JoVE)**

14. “*Fabrication of Smooth Patterned Structures of Refractory Metals, Semiconductors, and Oxides via Template Stripping*”, Hyuk J., Nagpal P., McPeak K.M., Lindquist N., Oh S.H., Norris D.J., ***ACS Applied Materials & Interfaces***, 5, 9701 (2013).
13. “*Plasmonic nanofocusing with a metallic pyramid and an integrated C-shaped aperture*”, Lindquist N., Johnson T.W., Nagpal P., Norris D.J., Oh S.H., ***Scientific Reports***, 3, 1857, (2013).
12. “*Measurement of electronic states of PbS nanocrystal quantum dots using scanning tunneling spectroscopy: The role of parity selection rules in optical absorption*”, Diaconescu B., Padilha L.A., Nagpal P., Swartzentruber B.S., Klimov V.I, ***Physical Review Letters***, 110, 127406, (2013).

Before Joining University of Colorado Boulder:

11. “*Single-Crystalline silver films for plasmonics*”, Hyuk J., Ambwani P., Manno M., Lindquist N., Nagpal P., Oh S.H., Leighton C., Norris D.J., ***Advanced Materials***, 24, 3988, (2012).
10. “*Improved dielectric function in metallic films obtained via template stripping*”, Hyuk J., Nagpal P., Oh S.H., Norris D.J., ***Applied Physics Letters***, 100, 081105, (2012).
9. “*Engineering metallic nanostructures for plasmonic and nanophotonics*”, Lindquist N., Nagpal P., McPeak K., Norris D.J., Oh S.H., ***Reports on Progress in Physics***, 75, 036501, (2012).

8. “*Role of mid-gap states in charge transport and photoconductivity in semiconductor nanocrystal films*”,
Nagpal P., Klimov V.I., *Nature Communications*, 2:486 , (2011).
7. “*Spectral dependence of nanocrystal photoionization probability: The role of hot-carrier transfer*”,
Padilha L.A., Robel I., Lee D.C., Nagpal P., Pietryga J.M., Klimov V.I., *ACS Nano*, 5, 5045, (2011).
6. “*Template-stripped smooth Ag nanohole arrays with silica shells for surface plasmon resonance biosensing*”,
Im H., Lee S.H., Wittenberg, N.J., Johnson T.W., Lindquist N., Nagpal P., Norris D.J., Oh S.H., *ACS Nano*, 5, 6244, (2011).

Press: **NanotechWeb** from **Institute of Physics**.

5. “*Fabrication of carbon/refractory metal nanocomposites as thermally stable metallic photonic crystals*”,
Nagpal P., Josephson D.P., Denny N.R., DeWilde J., Norris D.J., Stein A., *Journal of Materials Chemistry*, 21, 10836, (2011).
4. “*Three-dimensional Plasmonic Nanofocusing*”,
Lindquist N., Nagpal P., Norris D.J., Oh S.H., *Nano Letters*, 10, 1369, (2010).
3. “*Ultra-smooth patterned metals for Plasmonics and Metamaterials*”,
Nagpal P., Lindquist N., Oh S.H., Norris D.J., *Science*, 325, 594, (2009).

Paper highlighted in **Nature Photonics** and **Nature Nanotechnology**.

Press: **Discovery Channel**, **Technology Review**, **Physics World**, **Chemistry World**.

2. “*Efficient low temperature thermophotovoltaic emitters from metallic photonic crystals*”,
Nagpal P., Han S.E., Stein A., Norris D.J., *Nano Letters*, 8, 3238, (2008).
1. “*Thermally stable organic-inorganic hybrid photoresists for fabrication of photonic band gap structures using direct laser writing*”,
Jun Y., Nagpal P., Norris D.J., *Advanced Materials*, 20, 606, (2008).

Patents:

After Joining University of Colorado Boulder:

15. “*Multiplexed Optical DNA Sequencing*”
PCT Application No: **62/595,551**
Filing Date: 12/6/2017
Applicants: Prashant Nagpal, D.M. Sagar, University of Colorado at Boulder

14. *“Nanostructured Photocatalysts and Doped Wide-Bandgap Semiconductors”*
Patent Application No: **15/827,278**
Filing Date: 11/30/2017
Applicants: Prashant Nagpal, Vivek Singh, Ignacio Castellanos Beltran, Yuchen Ding, Yahya Alivov, University of Colorado at Boulder
13. *“Novel Light-Activated Compositions and Methods Using the Same”*
PCT Application Number: **62/136,128**
Filing Date: 3/20/2015
Applicants: Prashant Nagpal, Anushree Chatterjee, Colleen M. Courtney, Samuel M. Goodman, University of Colorado at Boulder
12. *“Quantum Molecular Sequencing (QM-Seq): Identification of unique nanoelectronic tunneling spectroscopy fingerprints for DNA, RNA, and single nucleotide modifications”*
Patent Application Number: **62/135,059**
Filing Date: 3/18/2015
Applicants: Prashant Nagpal, Anushree Chatterjee, Larry Gold, PRAAN Biosciences Inc.
11. *“Replication of patterned thin film structures for use in plasmonics and metamaterials”*
Patent Application Number: **14/578,873**
Filing Date: 12/22/2014
Applicants: David J. Norris, Sang Eon Han, Prashant Nagpal, Aditya Bhan, University of Minnesota.
10. *“Quantum Molecular Sequencing (QM-Seq): Identification of unique nanoelectronic tunneling spectroscopy fingerprints for DNA, RNA, and single nucleotide modifications”*
U.S. Patent Application Number: **16/050,624**
Filing Date: 07/31/2018
Applicants: Prashant Nagpal, Anushree Chatterjee, Josep Casamada Ribot.
9. *“Quantum Sequencing (Q-Seq): Identification of unique nanoelectronic fingerprints for DNA, RNA, and single nucleotide modifications”*
PCT Application Number: **PCT/US2014/055512**
Filing Date: 9/13/2014
Applicants: Prashant Nagpal, Anushree Chatterjee, Josep Casamada Ribot, University of Colorado at Boulder
8. *“Nanostructured Photocatalysts and Doped Wide-Bandgap Semiconductors”*
Issued US Patent No: **9873115**
Filing Date: 7/1/2014
Award Date: 1/23/2018
Applicants: Prashant Nagpal, Vivek Singh, Ignacio Castellanos Beltran, Yuchen Ding, Yahya Alivov, University of Colorado at Boulder
7. *“Doping widebandgap semiconductor nanotubes”*

Patent Application Number: **61/879,168**

Filing Date: 9/18/2013

Applicants: Prashant Nagpal, Yahya Alivov, Vivek Singh, Yuchen Ding, Logan Jerome Cerkovnik, University of Colorado at Boulder

6. *“Third generation sequencing using STM-STS for fast detection of single DNA molecules and single nucleotide modifications”*

Patent Application Number: **61/877,634**

Filing Date: 9/13/2013

Applicants: Prashant Nagpal, Anushree Chatterjee, Josep Casamada Ribot, University of Colorado at Boulder

5. *“Photocatalyst for carbon dioxide-water reduction”*

Patent Application Number: **61/841,510**

Filing Date: 7/1/2013

Applicants: Prashant Nagpal, Ignacio Beltran, Vivek Singh, Yahya Alivov, University of Colorado at Boulder

Before Joining University of Colorado Boulder:

4. *“Replication of patterned thin-film structures for use in plasmonics and metamaterial”*

Patent Application Number: **PCT/US2009/006255**

Filing Date: 11/24/2009

Applicants: David J. Norris, Prashant Nagpal, University of Minnesota.

3. *“Creation of light and/or surface plasmons with heated metallic films”*

Provisional Patent

Applicants: David J. Norris, Sang Eon Han, Prashant Nagpal, University of Minnesota.

2. *“An improved process for continuous production of colloidal liquid aphrons and a device therefore”*

Patent Application Number: **3232/DEL/2005**

Filing Date: 12/01/2005

Applicants: A.N. Bhaskarwar, Prashant Nagpal, I.I.T. Delhi.

1. *“An improvement relating to multi-phasic reactions”*

Patent Application Number: **123/DEL/2010**

Filing Date: 01/22/2010

Applicants: A.N. Bhaskarwar, Prashant Nagpal, I.I.T. Delhi.

Invited Presentations:

After Joining University of Colorado Boulder:

1. *“Quantum biology: A new paradigm for precision medicine?”*,
Invited talk (Scheduled Fall), Chemical Engineering Department Seminar,

NYU, 2018, New York City.

2. “*Quantum biology: A new paradigm for precision medicine?*”, **Invited talk (Scheduled Fall)**, Chemical and Biological Engineering Department Seminar, Princeton University, 2018, Princeton N.J.
3. “*Quantum biology: A new paradigm for precision medicine?*”, **Invited talk**, Institute of Systems Biology, ISB, 2018, Seattle.
4. “*Precision medicine: Developing quantum biology for transformative healthcare solutions*”, **Invited talk**, Biotechnology Department Seminar, All India Institute of Medical Science (A.I.I.M.S.), 2018, New Delhi.
5. “*Antimicrobial resistance: Precision diagnostics and novel therapeutics to fight the superbugs*”, **Invited talk**, Microbiology Department Seminar, All India Institute of Medical Science (A.I.I.M.S.), 2018, New Delhi.
6. “*Quantum Chemistry and Biology: From new catalysts for photons to specific fuels, to novel therapeutics in fight against the superbugs*”, **Invited talk**, Chemistry Department Seminar, Indian Institute of Technology (I.I.T.) Delhi, 2018, New Delhi.
7. “*Quantum biology: transforming detection, diagnosis and treatment*”, **Invited talk**, Chemical and Biomolecular Engineering Department Seminar, Cornell University, 2017, Ithaca.
8. “*Quantum biology: transforming detection, diagnosis and treatment*”, **Invited talk**, Chemical and Biomolecular Engineering Department Seminar, Cornell University, 2017, Ithaca.
9. “*Quantum biology: transforming detection, diagnosis and treatment*”, **Invited talk**, Chemical and Biochemical Engineering Department Seminar, University of Iowa, 2017, Iowa City.
10. “*Quantum biology: transforming detection, diagnosis and treatment*”, **Invited talk**, Physics Department Symposium and Nanoscience Seminar, Arizona State University, 2016, Tempe.
11. “*Nanoscale optics and plasmonics: Light, electron, plasmon!*”, and “*Nanoscaled biology: selective light-activated therapy*”, **Invited talk**, NanoBio Institute (UIUC) Workshop, 2016.

12. “*Nucleic acid macromolecules: Sequencing, nano-bioelectronics and more..*”,
Invited talk, Soft Matter MRSEC, 2016, Boulder.
13. “*Energy transport in nanomaterials for photon upconversion and long-range exciton transport*”,
Invited talk, Institute for Complex Adaptive Matter (ICAM) Workshop on Energy Transport, 2015, Boulder.
14. “*Novel spectroscopic techniques and materials development at nanoscale*”,
Invited talk, Physics Department, University of California Merced, 2015, Merced.
15. “*Tailoring fundamental interactions at nanoscale to create a menu card of materials, properties and applications in energy and biology*”,
Invited talk, Chemical and Biological Engineering, Drexel University, 2015, Philadelphia.
16. “*Nucleic acid macromolecules: Molecular self-assembly, nano-bioelectronics and more..*”,
Invited talk, Soft Matter Nanophotonics Symposium, University of Colorado Boulder, 2015, Boulder.
17. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Venrock Capital, 2015, Boulder.
18. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, ARCH Venture Partners, 2015, Boulder.
19. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Google, 2015, Boulder.
20. “*Nanoscaled biology: Nano-Optics and Quantum Biology*”,
Invited talk, NanoBio Center, University of Illinois Urbana Champaign, 2015, Champaign.
21. “*For big solutions think small: From quantum dots to nucleic acids*”,
Invited talk, Physics Department, University of Colorado, 2015, Boulder.
22. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Agilent Technologies, 2015, Santa Clara.
23. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Hoffman La-Roche, 2014, Boulder.
24. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Affymetrix Inc., 2014, Boulder.
25. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Bill & Melinda Gates Foundation, 2014.

26. “*Quantum Molecular Sequencing (QM-Seq)*”,
Invited talk, Third Rock Ventures, 2014.
27. “*Quantum Sequencing: Using nanoscale physics for biochemical assay of single molecules*”,
Invited talk, Agilent Technologies, 2014, Boulder.
28. “*Quantum Sequencing: Using nanoscale physics for biochemical assay of single molecules*”,
Invited talk, W.M. Keck Foundation, 2014.
29. “*Quantum Sequencing: Using nanoscale physics for biochemical assay of single molecules*”,
Invited talk, SomaLogic Inc., 2014, Boulder.
30. “*Quantum Sequencing: Using nanoscale physics for biochemical assay of single molecules*”,
Invited talk, Jennie and Smoly Caruthers Symposium, University of Colorado, 2014, Boulder.
31. “*Exciton transport and manipulation in colloidal semiconducting carbon nanotubes*”,
Invited talk, The Electrochemical Society (ECS) Meeting, 2013, Toronto.
32. “*Third generation photovoltaics*”,
Invited talk, BIG Energy Seminar Series, National Renewable Energy Laboratory, 2013, Golden.

Before Joining University of Colorado Boulder:

33. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”,
Invited talk, Chemical and Biomolecular Engineering, University of Pennsylvania, 2012, Philadelphia.
34. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”,
Invited talk, Chemical and Biological Engineering, University of Buffalo, 2012, Buffalo.
35. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”,
Invited talk, School of Materials Science and Engineering, Georgia Tech., 2012, Atlanta.
36. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”,
Invited talk, Chemical and Biological Engineering, University of Colorado Boulder, 2012, Boulder.
37. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”,
Invited talk, Chemical Engineering, University of Michigan, 2012, Ann Arbor.

38. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Rice University, 2012, Houston.
39. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Materials Science and Engineering, University of California Santa Barbara, 2012, Santa Barbara.
40. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Chemical Engineering, University of Texas Austin, 2012, Austin.
41. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, National University of Singapore, 2012, Singapore.
42. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Chemical Engineering, University of Rochester, 2012, Rochester.
43. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Chemical and Biomolecular Engineering, University of Illinois Urbana Champaign, 2012, Champaign.
44. “*Third generation photovoltaics: Harnessing the heat or “hot” carriers*”, **Invited talk**, Chemical Engineering, University of Illinois Chicago, 2012, Chicago.
45. “*Role of quantized and mid-gap states in ‘dark’ charge transport and photoconductivity in semiconductor nanocrystal films*”, **Invited talk**, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2011, Minneapolis.
46. “*Probing charge transport in exploratory nanocrystal-based devices*”, **Invited talk**, American Vacuum Society (AVS) 57th International Meeting, 2010, Albuquerque.
47. “*Ultrasmooth patterned metals for plasmonics and metamaterials*”, **MRS Graduate Student Award talk**, Materials Research Society (MRS) Fall Meeting, 2009, Boston.
48. “*Metal photonics and plasmonics for energy applications*”, **Invited talk**, Material Science Department, Stanford University, 2009, Palo Alto.
49. “*Metal photonics and plasmonics for energy applications*”, **Invited talk**, Heath Group, Department of Chemistry, California Institute of Technology, 2009, Pasadena.
50. “*Metal photonics and plasmonics for energy applications*”, **Invited talk**, Department of Chemistry, University of Chicago, 2009, Chicago.

Contributed Presentations:

After Joining University of Colorado Boulder:

1. *“Developing Precision Medicine Using Quantum Biology: Combining Quantum States, Surface Chemistry, and Microbiology”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2017, Minneapolis.
2. *“Quantum Molecular Sequencing: Unravelling Genomic Information One Molecule at a Time”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2017, Minneapolis.
3. *“Photon Upconversion and High-Throughput Optical DNA Sequencing: Putting a Squeeze on Light”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2017, Minneapolis.
4. *“Photoexcited Quantum Dots for Killing Multidrug-Resistant Bacteria”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2016, San Francisco.
5. *“Photoexcited Quantum Dots Potentiate Antibiotic Activity in Multidrug-Resistant Bacteria”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2016, San Francisco.
6. *“Novel light-activated therapy for multi-drug resistant pathogens”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
7. *“Quantum Molecular-Sequencing (QM-Seq): Single Molecule DNA and RNA Sequencing”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
8. *“Multiple Energy “Exciton-Shelves” in Quantum-Dot-DNA Nanobioelectronic Materials”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
9. *“Novel Light-Activated Nano-Therapeutics for Selective Cell Phenotypes”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
10. *“Plasmon-Enhanced Energy Transfer and Other Photophysical Effects in Doped-Lanthanide Nanocrystals”*,

American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.

11. *“Artificial Photosystem I and II: Highly Selective Solar Fuels and Tandem Photocatalysis”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
12. *“Quantum Molecular-Sequencing (QM-Seq): Nanoelectronic Single Molecule DNA/RNA Sequencing and Epigenetics”*,
American Institute for Chemical Engineers (AIChE) Annual Meeting, 2015, Salt Lake City.
13. *“Novel light-triggered therapeutics for selective cell-phenotypes”*,
Materials Research Society (MRS) Spring Meeting, 2015, San Francisco.
14. *“Multiple Energy “Exciton-Shelves” in Quantum-Dot-DNA Nano-Bioelectronic Materials”*,
Materials Research Society (MRS) Spring Meeting, 2015, San Francisco.
15. *“Novel light-triggered therapeutics for selective cell-phenotypes”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
16. *“Plasmon-enhanced energy transfer and other photophysical effects in doped-lanthanide nanocrystals”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
17. *“Copper plasmonics and catalysis: Role of electron-phonon interactions in dephasing localized surface plasmon”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
18. *“Pseudo-direct bandgap transitions in silicon nanocrystals: Effect on optoelectronics and thermoelectrics”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
19. *“Artificial photosystem I and II: Highly selective solar fuels and tandem photocatalysis”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
20. *“Doping of wide-bandgap titanium-dioxide nanotubes: Optical, electronic and magnetic properties”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
21. *“Multiple energy “exciton-shelves” in quantum-dot-DNA nanobioelectronic materials”*,
American Chemical Society (ACS) Meeting, 2015, Denver.
22. *“Quantum molecular-sequencing (QM-Seq): Single molecule DNA and RNA sequencing”*,

American Chemical Society (ACS) Meeting, 2015, Denver.

23. “*Specifically tuned light activated nano-therapeutics for selective cell phenotypes*”, American Chemical Society (ACS) Meeting, 2015, Denver.
24. “*Effect of Surface Plasmons on Near-Field Nanoptics and Other Photophysical Processes in Upconverting Nanoparticles*”, Materials Research Society (MRS) Fall Meeting, 2014, Boston.
25. “*Quantum Sequencing: Biophysics of quantum tunneling through nucleic acids*”, American Physical Society (APS) March Meeting, 2014, Denver.
26. “*Quantum Sequencing: Fast electronic single DNA molecule sequencing*”, American Physical Society (APS) March Meeting, 2014, Denver.
27. “*‘New’ energy states lead to phononless optoelectronic properties in nanostructured silicon*”, American Physical Society (APS) March Meeting, 2014, Denver.
28. “*Using surfaces, ligands and dimensionality to obtain desired nanostructure properties*”, American Physical Society (APS) March Meeting, 2014, Denver.
29. “*Exciton-shelves for charge and energy transport in third-generation quantum-dot devices*”, American Physical Society (APS) March Meeting, 2014, Denver.
30. “*Artificial Photosystem I and II: Highly selective solar fuels and tandem photocatalysis*”, American Physical Society (APS) March Meeting, 2014, Denver.
31. “*Quantum Sequencing: A new Third-generation sequencing technology*”, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2013, San Francisco.
32. “*Hot carrier photovoltaics and photocatalysis*”, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2013, San Francisco.
33. “*Smaller than the bandgap: A Tale of low energy photons*”, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2013, San Francisco.

Before Joining University of Colorado Boulder:

34. “*Role of quantized and mid-gap states in ‘dark’ charge transport and photoconductivity in semiconductor nanocrystal films*”, Materials Research Society (MRS) Fall Meeting, 2011, Boston.
35. “*Role of quantized and mid-gap states in ‘dark’ charge transport and photoconductivity in semiconductor nanocrystal films*”,

American Vacuum Society (AVS) 58th International Meeting, 2011, Nashville.

36. *“Tailoring thermal emission using photonic and plasmonic metal nanostructures”*, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2011, Minneapolis.
37. *“Role of quantized and mid-gap states in charge transport in semiconductor nanocrystal films”*, American Institute of Chemical Engineers (AIChE) Annual Meeting, 2011, Minneapolis.
38. *“Template stripped metal nanostructures and semiconductor nanocrystal optical FETs”*, Poster Presentation, Gordon Research Conference on Plasmonics, 2010, Colby College.
39. *“Ultrasmooth patterned metals for plasmonics and metamaterials”*, Poster Presentation, Gordon Research Conference on Clusters, Nanocrystals and Nanostructures, 2009, Mount Holyoke.
40. *“Altering the glow of a nanostructured metal: From thermophotovoltaics to thermal beaming”*, Materials Research Society (MRS) Spring Meeting, 2009, San Francisco.
41. *“Designing molecules and interfaces for 3D fabrication”*, Materials Research Society (MRS) Spring Meeting, 2009, San Francisco.
42. *“Beaming thermal emission from metallic bullseye”*, Materials Research Society (MRS) Spring Meeting, 2009, San Francisco.
43. *“Ultrasmooth patterned metals for plasmonics and metamaterials”*, Iprime Annual Meeting, 2009, Minneapolis.
44. *“Metamaterials for renewable energy generation”*, IPrime Annual Meeting, 2009, Minneapolis.
45. *“Using direct laser writing to fabricate metallic photonic crystals for thermophotovoltaic Applications”*, Materials Research Society (MRS) Spring Meeting, 2008, San Francisco.
46. *“Metallic Photonic Crystals for high Temperature applications”*, IPrime Annual Meeting, 2007, Minneapolis.
47. *“Thermally stable photoresists for fabrication of 3D photonic crystals via direct laser writing and holography”*, Materials Research Society (MRS) Spring Meeting, 2007, San Francisco.
48. *“Metallic nanostructures for high temperature application”*, 3M, 2007, Saint Paul.

49. “Development of methylsilsequioxane based thermally stable photoresist for holographic lithography and Direct Laser Writing”, IPrime Annual Meeting, 2006, Minneapolis.
50. “Inorganic-organic hybrid photoresist”, 3M, 2006, Saint Paul.
51. “Phase mask holographic lithography in hybrid photoresist”, IPrime Annual Meeting, 2005, Minneapolis.

Reviewer for Journals:

- *Nano Letters, ACS Nano, Chemistry of Materials, Journal of Physical Chemistry*
- *Advanced Materials, Advanced Functional Materials, Advanced Energy Materials, Small*
- *Journal of Materials Chemistry*
- *Thin Solid Films*
- *Optics Express, Optics Letters, Journal of Optical Society of America A and B, Applied Optics.*

Professional Associations:

- Associate Editor, *Frontiers in Chemistry* (Nanoscience)
- Panel Reviewer for *National Science Foundation (NSF)* (Programs: EPMD, CBET).
- Panel Reviewer for *Department of Energy (DOE)*.
- Panel Reviewer for *National Research Foundation of South Africa*.
- Panel Reviewer for the *Indo-US Science & Technology Forum (IUSSTF)* by the *American Association for the Advancement of Science AAAS*
- Symposium Organizer and Chair, *Materials, Research Society*, Fall 2011, 2014.
- Topical Conference Chair, *AIChE Annual Meeting* 2011-2017.
- *Topical Energy Frontier Conference*, Board Member and Session Chair, AVS, 2011.
- Reviewer for academic journals by publishers (partial list): *American Chemical Society (ACS)*, *John Wiley*, *American Institute of Physics (AIP)*, *Royal Society of Chemistry (RSC)*, *Institute of Physics (IOP)*, and *Optical Society of America (OSA)*.
- Member, *Materials Research Society*, 2007-.
- Member, *American Vacuum Society*, 2010-.
- Member, *American Institute of Chemical Engineers*, 2011-.
- Student Representative, *Academic Interaction Council*, I.I.T. Delhi, 2003-04.
- Member, *Chemical Engineering Society*, 2000-2004.
- Intern, *Indo-Gulf Fertilizers*, U.P., India, May-July 2003.
- Intern, *Unilever Research Center*, Bangalore, India, May-July 2002.

Classes Taught:

FCQ out of 6.0

1. Course title: Design of Materials
 Term: Spring 2018 Number of Students: 5
 FCQ: Course Overall: 5.8 Instructor Overall: 6.0

2. Course title: Applied Data Analysis
Term: Fall 2017 Number of Students: 79
FCQ: Course Overall: 2.9 Instructor Overall: 2.9
3. Course title: Design of Materials
Term: Fall 2016 Number of Students: 10
FCQ: Course Overall: 5.6 Instructor Overall: 5.7
4. Course title: Chemical Engineering Materials
Term: Spring 2016 Number of Students: 121
FCQ: Course Overall: 3.9 Instructor Overall: 4.4
5. Course title: Chemical Engineering Materials
Term: Spring 2015 Number of Students: 46
FCQ: Course Overall: 4.7 Instructor Overall: 4.8
6. Course title: Applied Data Analysis
Term: Fall 2014 Number of Students: 36
FCQ: Course Overall: 4.0 Instructor Overall: 4.0
7. Course title: Chemical Engineering Materials
Term: Spring 2014 Number of Students: 54
FCQ: Course Overall: 5.1 Instructor Overall: 5.3
8. Course title: Chemical Engineering Thermodynamics
Term: Fall 2013 Number of Students: 113
FCQ: Course Overall: 3.7 Instructor Overall: 3.5
9. Course title: Special topics in ChBE
Term: Fall 2013 Number of Students: 2
FCQ: Course Overall: 6.0 Instructor Overall: 6.0
10. Course title: Chemical Engineering Thermodynamics
Term: Fall 2012 Number of Students: 103
FCQ: Course Overall: 3.4 Instructor Overall: 3.2

Student mentoring and training:

Undergraduate Students:

1. Logan Jerome Cerkovnik (ChBE, 2012-2014, B.S.)
2. Michael Oseth (ChBE, Spring 2013, B.S.)
3. Vishnu Nirmala Saseendran (ChBE, Spring 2013, B.S.)
4. Jaeda Sichel (ChBE, 2013, B.S.)
5. Albert Siu (ChBE, 2013-2015, B.S.)
6. Jessica Ann McDaniel (ChBE, 2013-2015, B.S.)

7. Zingyi (Cynthia) Zhou (ChBE, 2013-2014, B.S.)
8. Sirisha Gudavalli (Fairview High School, 2014)
9. Ritika Reddy (Rice University, Summer 2015, B.A/B.S.)
10. Fatemah Aljawad (ChBE, Fall 2015, B.S.)
11. Badriya Dhuhli (ChBE, Fall 2015, B.S.)
12. Madison Gallipo (ChBE, 2016-2017, B.S.)
13. William Nelson Sheldon (ChBE, Spring-Summer 2017, B.S.)
14. Rathan Kumar (MCDB, Summer 2017, B.S.)
15. Andrew Drazkowski (ChBE, Summer 2017, B.S.)

Graduate Students:

1. Samuel M. Goodman (ChBE, PhD. Fall 2016)
2. Yuchen Ding (Chemistry, 2012- 2017, PhD. Fall 2017)
3. Josep Casamada Ribot (ChBE, 2012-2015, M.S.)
4. Ibrahim Khalifa Saleh (Mech. Eng., 2016-Present)
5. Lee Erik Korshoj (ChBE, 2015-Present)
6. Partha Pratim Choudhry (ChBE, 2015-Present)
7. Max Levy (ChBE, 2016-Present)
8. Emerson L. Grey, formerly Katrina Hanson (ChBE, 2016-Present)
9. John R. Bertram (Mat. Sci., 2017-Present)

Postdoctoral Advisees:

1. Dr. Vivek Singh (2012- 2015)
2. Dr. Qi-C. Sun (2013-2015)
3. Dr. Yahya Alivov (2013-2014)
4. Dr. Manjunatha Sagar Dodaveri (2015-2016)
5. Dr. FeiFei Li (2015-2016)
6. Dr. Sajida A. Khan (2015-2017)
7. Dr. Sepideh Afsari (2015-2017)
8. Dr. Gary Robert Abel (2016-Present)
9. Dr. Yuchen Ding (2018-Present)

Service Activities:

Journal Editor and Editorial Board Member:

2017- Associate Editor, *Frontiers in Chemistry* (Nanoscience)

2015- Editorial Board Member, *Journal of Materials Science and Applications (JMSA)*

Conference Sessions and Chair:

1. AIChE Annual Meeting 2012, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer
2. AIChE Annual Meeting 2013, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer

3. AIChE Annual Meeting 2014, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer
4. Materials Research Society Fall Meeting 2014, Symposium II: Semiconductor nanocrystals, plasmonic metal nanoparticles and metal-hybrid structures (12 sessions)
Role: Session Chair, Organizer
5. AIChE Annual Meeting 2015, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer
6. AIChE Annual Meeting 2016, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer
7. AIChE Annual Meeting 2017, Topical 5: Nanomaterials for Energy Applications (10-11 symposia)
Role: Topical Chair, Session Chair, Organizer

Panel Reviewer Funding Agencies:

1. National Science Foundation (NSF) 2014, 2018 CBET.
2. Department of energy (DOE) 2014.
3. National Research Foundation of South Africa 2014.
4. National Science Foundation (NSF) 2014, ECCS, EPMD.

Reviewer for Journals (indicated above)

References: *Available on Request*