ANIRUDDHA RAY
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EDUCATION:

- **PhD in BioPhysics, *University of Michigan, Ann Arbor*** **2008-12**
  Research: Photoacoustics and Fluorescence based Nanoprobes towards Functional and Structural Imaging *in vivo*.
- **Integrated MSc in Physics, *Indian Institute of Technology, Kharagpur*** **2003-08**
  Combined Bachelor of Science (Honors) and Master's in Physics
  Specialization: Lasers and Nonlinear Optics.

ACADEMIC APPOINTMENTS:

- **Jan 2019-Present:** Assistant Professor in Physics and Astronomy, University of Toledo, Toledo, OH, USA
- **June 2019-Present**: Adjunct Faculty in Dept. of Radiation Oncology, University of Toledo, OH, USA
- **2019-2020**: Academic Affiliate in the Dept. of Chemistry, University of Michigan, MI, USA
- **July 2015-Dec 2018:** Post-Doctoral Researcher at the Department of Electrical Engineering and David Geffen School of Medicine, University of California, Los Angeles, CA, USA.
- **Apr 2014-June 2015:** Research Faculty at the National Institute of Standards and Technology & University of Colorado, Boulder, USA
- **Jan 2013-Mar 2014:** Post-Doctoral Research Fellow, Department of Chemistry and Biophysics, University of Michigan, Ann Arbor, MI, USA
- **Sept 2008-Dec 2012:** Graduate Student Research Assistant, Department of Chemistry and Biophysics, University of Michigan, Ann Arbor, MI, USA
- **Summer 2008:** Visiting Researcher at National Tsinghua University, Hsinchu, Taiwan
- **Summer 2007:** Visiting Researcher at Max Planck Institute of Optics and Photonics, Erlangen, Germany
- **Summer 2005:** Visiting Researcher at University of Arizona, Tucson, USA
- **2005-2008:** Undergraduate Research Assistant, Indian Institute of Technology, Kharagpur, India

HONORS/AWARDS

- Scialog: Advanced Bioimaging collaborative award, Research Corporation for Science Advancement (RCSA) and the Frederick Gardner Cottrell Foundation **2021**
- Selected as Scialog Fellow in Advancing Bioimaging, RCSA **2021**
- Cotton Incorporated Research Grant **2020**
- NIH Ruth L. Kirschstein National Research Service Award (T32 grant) **2017-18**
- NIST (US Dept. of Commerce) PREP program for postdoctoral research **2014**
- Travel Grant from University of Sao Paulo, *Brazil.* **2013**
- The SPIE student Scholarship in Optics and Photonics. **2012**
- University of Michigan Rackham Research Grant. **2010**
- PIBS (Program in Biomedical Science) fellowship, Univ. of Michigan Ann Arbor. **2008**
- Nominated from India for the British Commonwealth Scholarship. **2008**
  (One student was selected nationwide in this category)

International Reviewing and Editorial Assignments:

- Reviewer for journals from SPIE, Optical Society of America (OSA), Royal Society of Chemistry (RSC), American Chemical Society (ACS), Elsevier and Springer, Nature Publishing Group (NPG).
- Book review from CRC press, (Taylor and Francis group).
- Reviewed Abstracts for BMES 2019 society meeting, Philadelphia.
- Editor of Mobile Diagnostics special issue- 2019-20, Diagnostics (MDPI publications)
- Guest editor of Luminescence Based Nano-sensors for Biomedical Applications, Sensors (MDPI publications) - 2021
- Review Editor, Frontiers in Photonics, (Frontiers Publications)-2021

- Topics Board Editor, Sensors (MDPI publications)-2021
- Proposal Reviewer for Israel's Ministry of Science and Technology, Israel -2021
- Proposal Reviewer for the Irish Research Council, Ireland - 2021

TEACHING & MENTORING:

University of Toledo

Phys 1300- Undergraduate level course on Physics in Everyday life (3 credits): Fall 2020, 2021
Responsibility: Lectures covering the physical principles behind energy extraction, use and dissipation and their relationship to fundamental laws of physics. Facilitating interactive learning via in-class discussions, projects and peer to peer learning.

Phys 3400- Undergraduate level course on Physical Principles of Energy Sources (3 credits): Spring 2019, 2020, 2021, 2022
Responsibility: Lectures covering the physical principles behind energy extraction, use and dissipation and their relationship to fundamental laws of physics. Facilitating interactive learning via in-class discussions, projects and peer to peer learning.

Phys 4950- Undergraduate Professional Development Seminar (1 credit): Fall 2021
Responsibility: Work primarily with junior/senior level physics or astronomy major undergraduates on topics relevant to near-term professional goals, e.g., graduate school applications, job interviews, career pathways, CV/resume, professional presentation skills, and ethical research.

Department of Physics and Astronomy Colloquium: Spring & Fall 2020, 2021, 2022
Responsibility: Arranging the colloquium in the department. This involves actively seeking prospective speakers from a variety of research backgrounds and making all the necessary arrangements for them.

University of Michigan (Graduate Student Teaching Assistant)

Chem 130- Undergraduate General Chemistry (3 credits): Fall 2011, Spring 2011, 2012
Responsibility: Presentation of complex concepts in tutorial class, demonstrate numerical problem solving and grading for 108 undergraduate students.

Biophys 521- Graduate level course on Biophysical Research Techniques: Spring 2012
Responsibility: Helping students understand complex concepts and assignments, preparing exams and grading.

PUBLICATIONS AND CONFERENCES:

- Peer reviewed journal publications: 34
- Peer reviewed conferences and invited talks: 46
- Google Scholar link: https://scholar.google.com/citations?user=N3S483EAAAAJ&hl=en

Peer Reviewed Publications: (* indicates equal contribution/co-first authorship)
Selected High Impact Publications (IF > 10):

1. **A. Ray***, A. Khalid*, A. Demcenko, M. Daloglu, D. Tseng, J. Reboud, J. M. Cooper and Aydogan Ozcan, "Holographic Detection of Nanoparticles using Acoustically Actuated Nanolenses, ***Nature Communications***, 11, Article number: 171 **(2020)**.
2. M. A. Khalid*, **A. Ray***, S. Cohen, D. Tseng, M. Tassierie, A. Demcenko, J. Reboud, A. Ozcan and J. Cooper, “Lens-free Nano-rheology By Visualization of Guided Acoustic Waves", ***ACS Nano,*** 13, 10, 11062-11069 **(2019)**.
3. Y. Zhang*, M. Ouyang*, **A. Ray***, T. Liu*, Janay Kong, Bijie Bai, D. Kim, A. Guziak, Y. Luo, A. Feizi, K. Tsai, Z. Duan, X. Liu, D. Kim, C. Cheung, S.Yalcin, H. Koydemir, O. Garner, D. Di Carlo and A. Ozcan, “Computational cytometer based on magnetically-modulated coherent imaging and deep learning”, ***Light: Science and Application,*** 8, Article number: 91 **(2019)**.

4. **A. Ray**, Y. E. Koo Lee, G. Kim and R. Kopelman, "Two-photon fluorescence imaging super-enhanced by multi-shell nano-photonic particles: Application to subcellular pH", ***Small,*** 8, 2213-2221 **(2012)**.

Complete list of Publications:

5. A. Kabir, A. Kharel, S. Malla, Z. Kreis, P. Nath, J. Wolfe, M. Hassan, D. Kaur, H. Sari-Sarraf, A. Tiwari, **A. Ray**, Automated detection of apoptotic versus nonapoptotic cell death using label-free computational microscopy. ***J Biophotonics***. https://doi.org/10.1002/jbio.202100310, (accepted) **(2021)**
6. P. Nath, S. Hamadna, L. Karamchand, J. Foster, R. Kopelman, J. Amar, **A. Ray**, "Intracellular detection of singlet oxygen using fluorescent nanosensors", ***Analyst***. 146, 3933-3941 **(2021)**.
7. D. Tukaramrao, S. Malla, S. Saraiya, R. Hanely, **A. Ray**, S. Kumari, D. Raman, A. Tiwari, A Novel Thienopyrimidine Analog, TPH104, Mediates Immunogenic Cell Death in Triple-Negative Breast Cancer Cells, ***Cancers,*** 13 (8), 1954 **(2021)**.
8. P. Nath, M. Kabir, S. Doust, **A. Ray**, Diagnosis of Herpes Simplex Virus: Laboratory and Point-of-Care Techniques, ***Infectious Disease Reports,*** 13 (2), 518-539 **(2021).**
9. P. Nath, A. Kabir, S. Khoubafarin Doust, Z. Kreais and **A. Ray**, "Detection of Bacterial and Viral Pathogens Using Photonic Point-of-Care Devices", ***Diagnostics***, 10(10), 841 **(2020)**.
10. A. Poddar, O. Sidibe, **A. Ray**, and Q. Chen, "Calcium spikes accompany the cleavage furrow ingression and cell separation during fission yeast cytokinesis", ***Molecular Biology of the Cell***, Vol. 32, No. 1 **(2020)**.
11. H. C. Koydamir and **A. Ray**, "Mobile Diagnostic Devices for Digital Transformation in Personalized Healthcare", ***Diagnostics***, 10(12), 1008 **(2020)**.
12. **A. Ray**, S. Esparza, D. Wu, M. Hanudel, H. Joung, B. Gales, D. Tseng, I. Salusky and A. Ozcan, "Measurement of Serum Phosphate Levels Using a Mobile Sensor", ***Analyst***, 145, 1841-1848 **(2020)**
13. Y. Wu*, **A. Ray***, Q. Wei, A. Feizi, X. Tong, E. Chen, Y. Luo, and A. Ozcan, Deep Learning Enables High-Throughput Analysis of Particle-Aggregation-Based Biosensors Imaged Using Holography, ***ACS Photonics***, 6, 294–301 **(2019).**
14. M. Daloglu, **A. Ray**, M. Collazo, C. Brown, D. Tseng, B. Chocarro-Ruiz, L. M. Lechuga, D. Cascio and A. Ozcan, Low-cost and portable UV holographic microscope for high-contrast protein crystal imaging, ***APL Photonics***, 4, 030804 **(2019)**.
15. **A. Ray**, S. Li, T. Segura and A. Ozcan, " High-Throughput Quantification of Nanoparticle Degradation Using Computational Microscopy and Its Application to Drug Delivery Nanocapsules", ***ACS Photonics***, 4, 1216-1224 **(2017)**.
16. **A. Ray**, M. Daloglu, J. Ho, A. Torres, E. McLeod, A. Ozcan, " Computational sensing of herpes simplex virus using a cost-effective on-chip microscope", ***Scientific Reports***, 7, 4856 **(2017)**.
17. M. Daloglu, **A. Ray**, Z. Gorocs, M. Xiong, R. Malik, E. McLeod, G. Bitan, and A. Ozcan, "Computational On-Chip Imaging of Nanoparticles and Bio-molecules using Ultraviolet Light", ***Scientific Reports***, 7, 44157 **(2017).**
18. **A. Ray,** P. Ranieri, L. Karamchand, B. Yee, J. Foster and R. Kopelman, "Real time monitoring of intracellular chemical changes in response to plasma irradiation", ***Plasma Medicine***, 7, 7-26 **(2017).**
19. T. Shirakura, **A. Ray** and R. Kopelman, "Polyethylenimine incorporation into hydrogel nanomatrices for enhancing nanoparticle-assisted chemotherapy", ***RSC Advances***, 6, 48016-48024 **(2016).**
20. **A. Ray**, R. Kopelman, B.Chon, K. Briggman, J. Hwang, "Scattering based hyperspectral imaging of plasmonic nanoplate clusters for biomedical applications", ***J. of Biophotonics***, 9, 721-729 **(2015).**
21. **A. Ray**, A. Mukundan, X. Zie, L. Karamchand, X. Wang and R. Kopelman, "Highly stable polymer coated nano-clustered silver plates: A multimodal optical contrast agent for biomedical imaging", ***Nanotechnology***, 25, 445104 (**2014**).
22. M. Qin, Y. E. Koo Lee, **A. Ray**, R. Kopelman, "Overcoming Cancer Multidrug Resistance by Codelivery of Doxorubicin and Verapamil with Hydrogel Nanoparticles", ***Macromolecular BioSci***. 14, 1106-1115 (**2014**).
23. T. Shirakura, T. Kelson, **A. Ray**, A. Malyarenko and R. Kopelman, "Hydrogel Nanoparticles with Thermally Controlled Drug Release", ***ACS Macro Letters***, 3, 602-606 **(2014).**

24. **A. Ray** and R. Kopelman, "Polyacrylaimde based hydrogel nanoprobes for biophotonic imaging of chemical analytes", ***Nanomedicine***, 8, 1829-38 **(2013)**.
25. H. K. Yoon, **A. Ray**, Y. E. Koo Lee, G. Kim, X. Wang and R. Kopelman "Polymer-Protein Hydrogel Nanomatrix for Stabilization of Indocyanine Green towards targeted Fluorescence and Photoacoustic Bio-imaging", ***J. of Mat. Chem B***, 1, 5611-5619 **(2013)**.
26. **A. Ray**, H. K. Yoon, Y. E. Koo Lee, X. Wang and R. Kopelman "Sonophoric nanoparticle aided pH *in vivo* using Photoacoustic spectroscopy" ***Analyst***, 138, 3126-30 **(2013)**.
27. L. Karamchand, G. Kim, S. Wang, H. J. Hah, **A. Ray**, R. Jiddou, Y. E. Koo Lee, M. A. Philbert and R. Kopelman, "Modulation of Hydrogel Nanoparticle Intracellular Trafficking by Multivalent Surface Engineering with Tumor Targeting Peptide", ***Nanoscale***, 5, 10327-44 **(2013)**.
28. **A. Ray**, J. Raijan, Y. E. Koo Lee, X. Wang and R. Kopelman, "Lifetime based photoacoustic oxygen sensing *in-vivo*" ***Journal of Biomedical Optics***, 17, 057004 **(2012)**.
29. **A. Ray**, X. Wang, Y. E. Koo Lee, H. J. Hah, G. Kim, T. Chen, D. A. Orringer, O. Sagher, X. Liu and R. Kopelman, "Targeted blue nanoparticles as photoacoustic contrast agent for Brain tumor delineation", ***Nano Research***, 4, 1163-1173 **(2011)**.
30. **A. Ray**, Y.E Lee Koo, T. Epstein, G. Kim and R. Kopelman, "Two-photon nano-PEBBLE sensors: subcellular pH measurements" ***Analyst***, 136, 3616-3622 **(2011)**.
31. **A. Ray**, S. K. Das, L Mishra, P.K. Datta and S. M. Saltiel, "Nonlinearly coupled gain switched second harmonic laser with variable pulse width", ***Applied optics***, 48, 748 **(2009)**.
32. A. Saha, **A. Ray**, S. Mukhopadhyay, P. K Datta, P.K. Dutta and S.Saltiel, "Littrow-type discretely tunable, Q-switched Nd:YAG laser around 1.3 micron", ***Applied Physics B***, 87, 431 **(2007)**.
33. **A. Ray**, S. K. Das, S. Mukhopadhyay and P. K. Datta, "Acousto-optic modulator stabilized low threshold mode-locked Nd:YVO4 laser", ***Applied Physics Letters***, 89, 221119 **(2006)**.
34. A. Saha, **A. Ray**, S. Mukhopadhyay, N. Sinha, P.K Datta and P.K. Dutta, "Simultaneous multiwavelength oscillation of Nd Laser around 1.3 micron: A possible source for coherent terahertz generation", ***Optics Express***, 14, 4721 **(2006)**.

Invited Talks:

1. **A. Ray,** Unconventional microscopy Techniques for Bio-medical Applications, Ohio University, Athens County, Ohio. (2021)
2. **A. Ray,** Unconventional techniques of imaging and microscopy, Texas Tech University, Lubbock, USA (Nov 2019).
3. **A. Ray**, Unconventional techniques of imaging and microscopy for bio-medical applications, University of Michigan, Ann Arbor, USA (Sept, 2019).
4. **A. Ray**, C. Lee, J. Foltz, J. Tan, J. Jo, X. Wang, R. Kopelman, Theranostic Nanotechnology and In-vivo Chemical Imaging for Subsurface Tumors, *PITTCON 2019*, Philadelphia, USA (March, 2019).

Peer Reviewed Conferences and Abstracts:

1. P. Nath, **A. Ray**, Highly fluorescent nanoparticles with perovskite core for tumor imaging, Photonics West 2022, San Francisco, USA.
2. M. Kabir, A. Kharel, S. Malla, Z. Kreais, P. Nath, J. Wolfe, M. Hassan, D. Kaur, A. Tiwari, **A. Ray**, Detection of apoptotic and necrotic cell death using holographic microscopy, Photonics West 2022, San Francisco, USA.
3. S. Khoubafarin, A. Kharel, S. Malla, P. Nath, D. Kaur, A.Tiwari, **A. Ray**, Monitoring the efficacy of chemotherapeutic drugs using dark field imaging, Photonics West 2022, San Francisco, USA.
4. N Charchi, K Xie, **A Ray**, E Parsai, D Shvydka, P Nath, Amplification of Reactive Oxygen Species Generation Under Gamma-Ray Irradiation for Gold Nanoparticle Mediated Radiation Therapy, *AAPM Annual Meeting 2021:MEDICAL PHYSICS (The American Association of Physicists in Medicine)*.
5. K Xie, **A Ray**, D Shvydka, Monte Carlo Simulation of Enhanced Free Radical Generation Due to Presence of Gold Nanoparticle Under High Energy Photon Irradiation, *AAPM Annual Meeting 2021:MEDICAL PHYSICS (The American Association of Physicists in Medicine)*.

6. P Nath, R Kopelman, J Foster, J Amar, **A Ray**, Fluorescent nanosensors for detection of intracellular singlet oxygen during plasma therapy, *Photonics West 2021*, San Francisco (virtual), USA.
7. **A. Ray**, S. Esparza, D. Wu, M. Hanudel, H. Joung, B. Gales, D. Tseng, I. Salusky and A. Ozcan, Smartphone based measurement of serum phosphate levels for patients with kidney disease, *Photonics West 2020*, San Francisco, USA.
8. K. Xie, D. Shyvdka, **A. Ray** and E. Parsai, Quantitative Characterization of Free Radical Generation Under High-Energy Photon Irradiation for Gold Nanoparticle Mediated Radiation Therapy, *AAPM Annual Meeting 2020 (The American Association of Physicists in Medicine)*.
9. Y. Wu, **A. Ray**, Q. Wei, A. Feizi, X. Tong, E. Chen, Y. Luo, A. Ozcan, Deep learning-based sensing of viruses using a particle aggregation assay, *Photonics West 2020*, San Francisco, USA.
10. T Liu, Y Zhang, M Ouyang, **A Ray**, O. Garner, D. Di Carlo, A. Ozcan et. al. Deep learning-based cytometer using magnetically modulated coherent imaging, *Emerging Topics in Artificial Intelligence 2020*, San Diego, USA.
11. T Liu, Y Zhang, M Ouyang, **A Ray**, O. Garner, D. Di Carlo, A. Ozcan et. al., Deep learning-enabled computational cytometer using magnetically-modulated coherent imaging, *Biophotonics Congress: Biomedical Optics 2020*, Washington DC, USA.
12. M. Hanudel, **A. Ray**, S. Esparza, D. Wu, H. Joung, B. Gales, D. Tseng, I. Salusky and A. Ozcan, Cost-effective mobile sensor for the measurement of serum phosphate, *Pediatric Academic Societies (PAS) 2020 Meeting*, Philadelphia, PA.
13. **A. Ray**, S. Esparza, D. Wu, M. Hanudel, H. Joung, B. Gales, D. Tseng, I. Salusky and A. Ozcan, Cost-Effective Mobile Sensor for Measurement of Serum Phosphate Concentration, *Biomedical Engineering society meeting, BMES 2019*, Philadelphia, USA.
14. Y. Wu, **A. Ray**, Q. Wei, A. Feizi, X. Tong, E. Chen, Y. Luo, A. Ozcan, Rapid Analysis of Particle-Aggregation Assays Using On-Chip Holography and Deep Learning, *Biomedical Engineering society meeting, BMES 2019*, Philadelphia, USA.
15. A. Khalid, **A. Ray**, A. Demcenko, S. Cohen, M. Tassieri, J. Reboud, A. Ozcan, and J. M Cooper Lens-free Microscopy Using Acoustically Actuated Nanolenses and its Applications, *Imaging and Applied Optics 2019*, Munich, Germany.
16. **A. Ray**, A. Khalid, A. Demenko, M. Daloglu, D. Tseng, J. M. Cooper and A. Ozcan, Holographic Microscopy with Acoustic Modulation For Detection Of Nano-sized Particles And Pathogens In Solution, *Conferences on Lasers and Electro Optics, CLEO 2019*, San Jose, USA.
17. Y. Wu, **A. Ray**, Q. Wei, A. Feizi, X. Tong, E. Chen, Y. Luo, and A. Ozcan, Particle-Aggregation Based Virus Sensor Using Deep Learning and Lensless Digital Holography, *Conferences on Lasers and Electro Optics, CLEO 2019*, San Jose, USA.
18. **A. Ray**, A. Khalid, A. Demenko, M. Daloglu, D. Tseng, J. M. Cooper and A. Ozcan, Acoustically Actuated Holographic Microscopy For Detection Of Nanoparticles In Solution, *Photonics West 2019*, San Fransisco, USA.
19. **A. Ray**, S. Li, T. Segura and A. Ozcan, Monitoring the Degradation of Drug Loaded Nanoparticles Using Wide-Field Holographic Imaging, *Biomedical Engineering society meeting, BMES 2018*, Atlanta, USA.
20. **A. Ray**, S. Li, T. Segura and A. Ozcan, High-throughput holographic monitoring of nanoparticle degradation for drug delivery applications, *Conferences on Lasers and Electro Optics, CLEO 2018*, San Jose, USA.
21. M. Daloglu, **A. Ray**, Z. Gorocs, M. Xiong, R. Malik, E. McLeod, G. Bitan, and A. Ozcan, On-chip ultraviolet holography for high-throughput nanoparticle and biomolecule detection, *Photonics West 2018*, San Fransisco, USA.
22. **A. Ray**, S. Li, T. Segura, A. Ozcan, Monitoring of nanoparticle degradation using holographic on-chip microscopy for drug delivery applications, *Photonics west 2018*, San Fransisco, USA.
23. **A. Ray**, H. Ho, M. Daloglu, E. McLeod and A. Ozcan, Cost-effective and label-free holographic biosensor for detection of Herpes Simplex Virus, *Photonics west 2017*, San Fransisco, USA

24. M. Daloglu, **A. Ray**, Z. Gorocs, M. Xiong, R. Malik, E. McLeod, G. Bitan, and A. Ozcan, On-chip Microscopy and Nano-particle Detection Using Ultraviolet Light, *Conferences on Lasers and Electro Optics, CLEO 2017*, San Jose, USA.
25. **A. Ray**, H. Ho, M. Daloglu, E. McLeod and A. Ozcan, Field-Portable Holographic Microscope for Label-free Detection of Herpes Simplex Virus, *Biomedical Engineering society meeting, BMES 2016*, Minneapolis, USA.
26. J. C. Hwang, **A. Ray**, P. P. Cheney, B. Chon, J. Y. Lee, K. A. Briggman, Label-free hyperspectral microscopy for scatter imaging of biological processes in cells, *Photonics west 2016*, San Fransisco, USA.
27. **A. Ray**, J. Hwang, X. Wang and R. Kopelman, Plasmonic nanoplate cluster for multimodal biomedical imaging, *Faraday Discussions on Nanoplasmonics 2015*, Royal Society of Chemistry, London, UK.
28. **A. Ray**, E. Y. Koo Lee, X. Wang, R. Kopleman, Nanoprobe aided Fluorescence and Photoacoustic imaging of structural features and chemical properties in vivo, *Gordon Conference on Lasers in Medicine and Biology 2014*, Holderness, USA.
29. T. Shirakura, **A. Ray**, T. Kelson and R. Kopelman, "Development of Temperature-Sensitive Hydrogel Nanoparticles for Targeted Chemotherapy", *Annual Meeting of the Controlled Release Society 2014, Hawaii, USA.*
30. **A. Ray**, E. Y. Koo Lee, X. Wang, R. Kopleman, Photoacoustics and Fluorescence based nanoprobes towards chemical and structural imaging in vivo, *Advanced International School on Modern Trends of Biophotonics 2013*, Sao Paolo, Brazil
31. S. N. Gucker, J. E. Foster, P. Ranieri, **A. Ray**, R. Kopelman, Quantifying the effect of plasma irradiation on internal properties of living cells, *IEEE International Conference on Plasma Science* (ICOPS) 2013, San Francisco, USA.
32. **A. Ray**, H.K. Yoon, R. Kopelman and X. Wang, "Nanosensor aided photoacoustic measurement of pH *in vivo"*, Photonics West 2013, San Fransisco, USA.
33. **A. Ray**, J. Rajain, Y. E. Koo Lee, X. Wang and R. Kopelman, "*In vivo* oxygen sensing using lifetime based photoacoustic measurement", Photonics West 2013, San Fransisco, USA.
34. **A. Ray**, H. K. Yoon, H. J. Ryu, Y. E. Koo Lee, G. Kim, X. Wang and R. Kopelman, "Polyacrylamide based ICG nanocarrier for enhanced fluorescence and photoacoustic imaging", Photonics West 2013, San Fransisco, USA.
35. P. Ranieri, S. Gucker, J. Foster, **A. Ray**, R. Kopelman, L. Karamchand, Comparison of an APPJ discharge characteristics to internal properties of living cells, *APS Gaseous Electronics Conference 2013*, Princeton, USA.
36. **A. Ray**, E. Y. Koo Lee, R. Kopelman, Metal enhanced two-photon fluorescent core-shell nanoprobesfor chemical imaging, *Gordon Conference on Lasers in Medicine and Biology 2012*, Holderness, NH, USA.
37. **A. Ray**, Y. E. Koo Lee, R. Elbez and R. Kopelman, "Targeted nanosensor aided three-dimensional pH mapping in tumor spheroids using two-photon microscopy", Photonics West 2012, San Fransisco, USA.
38. **A. Ray**, X. Wang, Y. E. Koo Lee, H. J. Hah, G. Kim, T. Chen, D. A. Orringer, O. Sagher, X. Liu and R. Kopelman, "Photo-acoustic imaging of blue nanoparticle targeted brain tumor for intra-operative glioma delineation", *European Conferences on Biomedical Optics 2011*, Munich, Germany.
39. **A. Ray**, E. Y. Koo Lee, G. Kim, T. Epstein and R. Kopelman, Two-photon pH sensing inside live cells using nano-PEBBLEs, *PITTCON 2011*, Atlanta, USA
40. S. Bhattacharya, **A Ray**, P. K. Datta, B. Prasad and R. K. Bhogra, Laser fired contacts in solar cells, *Proceedings of National Conference on the Emerging Trends in the Photovoltaic energy Generation and Utilization 2008*, Kanpur, India.
41. P.K. Datta, **A. Ray**, K.Hussain, S. Mukhopadhyay, "Acousto-Optic-Modulator-Stabilized, Low Threshold Nonlinear Mirror Mode-locked Laser" *CLEO-Pacific 2007*, Seoul, South Korea.
42. **A. Ray**, A. Saha, S. Mukhopadhyay and P. K. Datta, Simultaneous multi-wavelength oscillation of Nd laser at 1.3 microns for coherent terahertz generation, *Photonics 2006*, Hyderabad, India.