

CURRICULUM VITAE

Dr. UMAKANTA TRIPATHY

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PROFILE

- 24 years of experience in Research and Development.
- 14 years of laboratory teaching experience for undergraduate (UG) and graduate students.
- 10 years of theory teaching for master, graduate and undergraduate students.
- Knowledge of different types of Cell cultures.
- Working expertise in microfluidic channels, *in-vivo* imaging of Zebrafish and C. Elegans.
- Proficiency in aligning and working with femtosecond, picosecond, nanosecond and continuous wave lasers.
- Working expertise in different microscopy systems like fluorescence microscopy, confocal microscopy, multi-photon microscopy, and nonlinear laser scanning microscopy.
- Trained in aligning femtosecond regenerative amplifiers (RegA 9000), optical parametric amplifiers (OPA) and optical parametric oscillators (OPO).
- Re engineered the cavity of a femtosecond OPO to make it lasing.
- Skilled in working with UV-Visible spectrophotometers, fluorimeters, time-correlated single photon counting (TCSPC), pump-probe systems, etc.
- Contributed fully/partially in the development of a combined multi-photon/confocal microscope, a super continuum generation setup, a nonlinear laser scanning microscope, a fluorescence up-conversion setup, a triplet-triplet annihilation (TTA) setup, an autocorrelation setup, and a Z-scan setup.
- Knowledge of computer programming, and software like mathematica, technical drawing, image analysis, etc.

AREAS OF SPECIALIZATION:

Biophysics, Non-linear optics, and ultrafast laser spectroscopy.

RESEARCH PROJECTS:

Our **Biophysics Research Group** at IIT (ISM) Dhanbad focuses on the following research projects:

- Design of new **bio-medical devices** for early stage disease diagnosis.
- Understanding protein energy landscape through nonlinear tools.
- Nonlinear studies of monoamine neurotransmitters related to neurodegeneration.
- Nonlinear studies of nanoparticles for drug delivery and cancer therapy.
- Understanding protein aggregation at single molecule level.
- Study of biomolecular interactions through spectroscopic tools.
- Molecular Docking and Molecular Dynamics (MD) simulation approach to comprehending biomolecular interactions.
- TD-DFT calculation of various biomolecules.

Future Goals:

- Multi-photon imaging, harmonic generation (SHG and THG) imaging and super-resolution imaging of cells, tissues, organs, etc. in *ex-vivo*, *in-vitro* and *in-vivo* studies.
- Development and application of other novel optical microscopy techniques and optical devices.

EDUCATION:

Indian Institute of Technology Madras (IITM), Chennai, TN, India, 2001-2006.

- **Ph.D.** in Physics, 2006, Specialization: Ultrafast Laser Spectroscopy & Nonlinear Optics.
Thesis title: “*Dipole-dipole interaction-induced excitation energy migration and transfer in organic dye-pairs and their nonlinear photo-physics*”.

Khallikote (Autonomous) College (Berhampur University), Berhampur, OR, India, 1995-2000.

- **M.Sc.** in Physics, 2000, Specialization: Electronics.
- **B.Sc.** in Physics (Honors), Mathematics, and Environment & Water Management, 1998.

ACCOMPLISHMENTS

- Received recognition from national and international levels for our computational work towards drug development for CoVID-19, 2020.
- Received Govt. of India recognition for developing a novel tool to study alpha-Synuclein protein aggregation that has a crucial role in Parkinson’s disease, 2020.
- Best poster award at the Photonics North Conference, Montreal, Canada, 2012.
- Marquis Who’s Who in the World, 27th edition, USA, 2010.
- Best poster award at the ASME Summer Bioengineering Conference, CA, USA, 2009.
- Postdoctoral Fellowship from the McGill University, Montreal, Canada, 2008-2011.

- Best poster award at the CSC, 91st Canadian Chemistry Conference and Exhibition, Edmonton, Canada, 2008.
- Postdoctoral Fellowship from the University of Saskatchewan, Saskatoon, Canada, 2006-2008.
- Senior Research Fellowship from the Council of Scientific and Industrial Research (CSIR), New Delhi, India, 2005-2006.
- Senior Research Fellowship from the IIT Madras, Chennai, India, 2003-2005.
- Best paper award at the International Conference on Optoelectronics and Technology, North Maharashtra University, Jalgaon, India, 2004.
- Best poster award at the Trombay Symposium on Radiation and Photochemistry, Bhaba Atomic Research Center (BARC), Mumbai, India, 2004.
- Junior Research Fellowship from the IIT Madras, Chennai, India, 2001-2003.
- Graduate Aptitude Test in Engineering (GATE), 2000.
- Held 1st position in the University during B.Sc. (1995-1998) & M.Sc. (1998-2000) programs.
- National merit scholarship awarded by Ministry of Human Resources and Development (MHRD), Govt. of India, 1993-2000.

ACADEMIC POSITIONS

<u>Associate Professor:</u>	Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad, Jharkhand, India. April 2021 - Till date.
<u>Assistant Professor:</u>	Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad, Jharkhand, India. December 2014 - April 2021.
<u>Visiting Scientist:</u>	Department of Chemical Sciences, Tata Institute of Fundamental Research (TIFR), Mumbai, Maharashtra, India, January 2013 - April 2014
<u>Casual Employee:</u>	Department of Physics, McGill University, Montreal, QC, Canada, September 2011 - August 2012.

STUDENT GUIDANCE

Postdoctoral Fellow

1. Dr. Manika Dandapat, March 2023 – Continuing.
2. Dr. Md. Mehkoom, March 2024 – Continuing.

Ph.D.

1. Mr. Bikash Chandra Swain, **Completed** (October 2020).
2. Miss. Sakshi, **Completed** (October 2020).
3. Mr. Janmejaya Rout, **Completed** (September 2022).
4. Mr. Nitesh Kumar Pathak, **Completed** (November 2024).
5. Mr. Priyadarshi Sahoo, July 2019 – Continuing.
6. Mr. Nandeshwar, August 2020 – Continuing.

7. Miss. Smita Manjari Panda, August 2021 – Continuing.
8. Mr. Tusar Kanti Rout, December 2023 – Continuing.
9. Mr. Subodha Kumar Sahu, December 2024 – Continuing.

M.Sc.

1. Mr. Shams Asif Md. Ehsan Ul Mamdud, Completed (2015-2016).
2. Mr. Ajay Kumar, Completed (2015-2016).
3. Miss. Rashmita Deheri, Completed (2016-2017).
4. Miss. Dipali Nayak, Completed (2016-2017).
5. Miss. Dipanwita Ray, Completed (2017-2018).
6. Mr. Bibhuti Bhusan Mahan, Completed (2018-2019).
7. Mr. Saiswarup Satwarup, Completed (2018-2019).
8. Mr. Gopichand Meena, Completed (2019-2020).
9. Mr. Amit Vikram, Completed (2019-2020).
10. Mr. Mohan Singh, Completed (2020-2021).
11. Mr. Tshewalo Rhakho, Completed (2021-2022).
12. Mr. Yeeshu Behera, Completed (2022-2023).
13. Mr. Rajesh Kumar Nayak, Completed (2022-2023).
14. Mr. Rohan Kumar, Completed (2022-2023).
15. Mr. Rahul, Completed (2023-2024).
16. Ms. Bhawna Kumari, Ongoing (2024-2025).

M.Tech.

1. Mr. MD. Haider Ansari, Completed (2021-2022)

B.Tech.

1. Mr. Dushyant Kumar Mahil, Completed (2016 – 2019).
2. Miss. Sagarika Bhagde, Completed (Dec 2017 – Jan 2018).
3. Mr. Vikas Meena, Completed (2017 – 2020).
4. Mr. Ranjan Yadav, Completed (2019 – 2020).
5. Mr. Shivang Mathur, Completed (2020 – 2021).
6. Miss. Priya Mondal, Completed (2020 – 2021).
7. Mr. Birjoy Krishnan Sonowal, Completed (2021-2022).
8. Mr. Sarthak Agrawal, Completed (2022 – 2024).
9. Ms. Shilpa Mahato, Completed (2022-2023).
10. Mr. Lele Nahush Kousthubh, Completed (2023-2024).
11. Mr. Patte Boya Eswar Sai, Completed (2023-2024).
12. Mr. Harshit Kumar, Ongoing (2024-2025).
13. Mr. Gyanendra Parmaar, Ongoing (2024-2025).
14. Mr. Uddagiri Jithendranadh, Ongoing (2024-2025).

RESEARCH PROJECTS (ONGOING/ COMPLETED)

1. “Monitoring the aggregation kinetics of Amyloid-beta and its inhibition”, Department of Science and Technology (**DST**), New Delhi, India, **3 years (2022-2025)**, ~ **33 Lakhs** (Value), **Principal Investigator (PI)**.
2. “Development of a sensitive tool to study the nonlinear properties of monoamine neurotransmitters”, Science and Engineering Research Board (**SERB**), Department of Science and Technology (**DST**), New Delhi, India, **3 years (2018-2021)**, ~ **37 Lakhs** (Value), **Principal Investigator (PI)**.
3. “To study the nonlinear properties of norepinephrine by using Z-scan technique”, **TEQIP-III, IIT (ISM) Dhanbad**, India, **2 years (2018-2020)**, ~ **2 Lakhs** (Value), **Principal Investigator (PI)**.
4. “Faculty Development Center (FDC) under Pandit Madan Mohan Malavya National Mission on Teachers and Teaching (PMMMNTT)”, Ministry of Human Resources and Development (**MHRD**), New Delhi, India, **3 years (2015-2018)**, ~ **7.56 Crores** (value), **Co-investigator**.
5. “Construction of a fluorescence correlation spectrometer, a single molecule bio-photonic tool for biophysical/ biochemical applications” under Faculty Research Scheme, **IIT (ISM) Dhanbad**, India, **3 years (2015-2018)**, ~ **11 Lakhs** (value), **Principal Investigator (PI)**.

ADMINISTRATIVE ROLES

1. Departmental Post Graduate Committee (DPGC) Convener: October 2022 – October 2024.
2. Vice-Chairman, JEE (Advanced): July 2022 – September 2023.
3. Institute Senate Member: Feb 2022 – Feb 2024.
4. Chief Hostel Warden: July 2022 – June 2024.
5. Member House Allotment Committee, December 2021 – Till date.
6. Hostel Warden: July 2020 – June 2022.
7. DPGC Member: July 2018 – October 2022.
8. Dept. Library Co-in-charge: May 2015 – Till date.
9. M.Sc. Dissertation In-Charge: Jan 2019 – June 2021.
10. Co-coordinator Faculty Development Center (FDC): July 2016 – September 2021.
11. Anti-ragging Squad member: July 2015 – July 2019.
12. B. Tech. Engg. Phys. Lab In-Charge: May 2015 – Jan 2019.
13. Int. M. Tech. AGP, Lab In-Charge: May 2015 – Jan 2019.

COURSES DEVELOPED (Fully)

Biomedical Engineering
Biophysics
Nonlinear Optics

COURSES DEVELOPED (Partially)

Electrodynamics
Optics and Optical Instrumentation
Numerical methods and Computer Programming
Electrodynamics and Radiation theory
Theoretical Physics
Experimental Physics
Laser Physics and Technology

PREVIOUS RESEARCH EXPERIENCE

Visiting Scientist: Biophotonics Laboratory, Department of Chemical Sciences, Tata Institute of Fundamental Research (TIFR), Mumbai, Maharashtra, India, January 2013 - April 2014 (Supervisor: Professor Sudipta Maiti)

- Construction of a Con-focal/ Multi-photon microscope.
- Multi-photon imaging of vesicular neurotransmitters in live animals.

Postdoctoral Research: Biophysics laboratory, Department of Physics, McGill University, Montreal, QC, Canada, September 2008-August 2012 (Supervisor: Professor Paul W. Wiseman).

- The third harmonic generation (THG), second harmonic generation (SHG), and two-photon fluorescence (TPF) imaging of Bio and Nano materials by multi-modal nonlinear laser scanning microscopy (NLSM) technique. This includes:
 - Early detection and quantification of malaria pigments (hemozoin) and development of a prototype malaria cell counter device to count the infected red blood cells by fluorescence correlation spectroscopy (FCS).
 - Development of a methodology for documenting the geometrical properties of the human and porcine vocal fold.
 - Investigating the structural remodeling of the human ascending aorta with dilation.
 - Multi-photon imaging of gold nanoparticles as a function of their size for cell tracking.

Postdoctoral Research: Ultrafast laser spectroscopy laboratory, Department of Chemistry, University of Saskatchewan, Saskatoon, SK, Canada, April 2006-September 2008 (Supervisor: Professor Ronald P. Steer).

- The study of the photo-physical properties of Tetrapyrroles (e.g. metalloporphyrins and their analogues (corroles)) excited in their Soret and higher energy UV absorption bands.
- Triplet-triplet annihilation (TTA) processes in metalloporphyrins under thin solid films as well as in liquid medium for noncoherent photon up-conversion studies.

Doctoral Research: Ultrafast laser spectroscopy laboratory, Department of Physics, IIT Madras, Chennai, TN, India, January 2001-April 2006 (Supervisors: Professor Prem B. Bisht and Professor A. Subrahmanyam).

- Dipole-dipole interaction-induced excitation energy migration and transfer in organic dye-pairs.
- Estimation of nonlinear photo-physical properties of organic dyes by Z-scan technique.

TEACHING EXPERIENCE

Instructor: I taught courses like: Lasers and Nonlinear Optics, Electrodynamics and Radiation Theory, Nonlinear Optical Processes and Devices, Biomedical Engineering, Nonlinear Optics, Electrodynamics, Energy Resources, Physics-II (Preparatory), Introduction to Biophysics etc., Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad, India, July 2015 - Continuing.

Instructor: General Physics Laboratory (M.Sc. Physics, Preparatory, B. Tech common and B. Tech. Engg. Physics), Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad, India, January 2015 - Continuing.

Instructor: Experimental Physics 659 (Master and Graduate students), Department of Physics, McGill University, Canada, March 2012.

- Super Resolution Microscopy: Nanoscopy.

Instructor: General Physics Laboratory (M.Sc. Physics and B. Tech common and B. Tech. preparatory), Department of Physics, IIT Madras, India, January 2001 - April 2006.

JOURNAL REVIEWER:

ACS Applied Nano Materials; Applied Optics; Acta Physica Polonica A; Analytical and Bioanalytical Chemistry; Asian Journal of Physics; Analytica Chimica Acta; Biomedical Optics Express; Biochemical Biophysical Research Communications; Biomedical Engineering and Computational Biology; Chem Bio Chem; Chem Phys Chem; Chemical Research in Toxicology; Current Computer Aided Drug Design; Chemistry Africa; Cancer Pathogenesis and Therapy; Current Medicinal Chemistry; Current Molecular Medicine; Egyptian Journal of Basic and Applied Sciences; Food Bioscience; Food Chemistry; Future Microbiology; Frontiers in Sustainable Food Systems; Heliyon; International Journal of Biological Macromolecules; Journal of Fluorescence; Journal of Ionic Liquids; Journal of Physical Chemistry; Journal of Medical Physics; Journal of Biomolecular Structure and Dynamics; Journal of Physical Chemistry; Journal of Nutrition and Health Sciences; Journal of Dentistry and Oral Care Medicine; Journal of Obesity and Diabetes; Luminescence; Langmuir; Measurement; Optical Materials Express; Optics letters; Optical Materials; Optics and Quantum Electronics; Physical Chemistry Chemical Physics; Rapid Reviews:C19; Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy.

PROJECT REVIEWER:

BIRAC-KIIT, India; SERB (DST), India; American University Beirut, Lebanon.

PUBLICATIONS

Journal Articles:

1. Rajat Kumar, Nitesh Kumar Pathak, Jayanta Kumar Sarkar, *Umakanta Tripathy*, Prasanta Kumar Datta, "Vibrational spectra of serotonin by terahertz time domain spectroscopy and DFT simulations," **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 329, 125541 (2025).
2. Smita Manjari Panda, Nandeshwar, and *Umakanta Tripathy*, "In silico screening and identifying phytoconstituents of *Withania somnifera* as potent inhibitors of BRCA1 mutants: A therapeutic against breast cancer," **International Journal of Biological Macromolecules**, 282, 136977 (2024).
3. Debasish Paul, Priyadarshi Sahoo, Arunava Sengupta, *Umakanta Tripathy*, and Soumit Chatterjee, "Revealing the Role of Electronic Effect to Modulate the Photophysics and Z-Scan Responses of *o*-Locked GFP Chromophores," **Journal of Physical Chemistry B**, 129(2), 692-711 (2024).
4. Jyotsna Patra, Poulami Das, Subhankar Nanda, Manika Dandapat, *Umakanta Tripathy*, and Amitava Adak, "Nonclassical plasmonic response of laser-plasma-engineered ultrasmall nearly-monodispersed clean copper nanoparticles," **Optics & Laser Technology**, 180, 111444 (2025).
5. Kavyashree Nagappa Kummur, Smita Manjari Panda, Mahantesh Basangouda Patil, *Umakanta Tripathy*, Ashok H Sidarai, "Revealing the interaction mechanism between bovine serum albumin (BSA) and a fluorescent coumarin derivative: A multispectroscopic and in silico approach," **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 318, 124466 (2024).
6. Kanchan Negi, Nitesh Kumar Pathak, *Umakanta Tripathy*, Sourav Kumar Dey, and Sumanta Kumar Sahu, "Two-photon NIR-responsive carbon dots incorporated into NMOFs for targeted photodynamic therapy," **Colloids and Surfaces A: Physicochemical and Engineering Aspects**, 694, 134163 (2024).
7. Indrajit Pal, Nitesh Kumar Pathak, Santanu Majumdar, Gerald Lepcha, Amiya Dey, Suresh Kumar Yatirajula, *Umakanta Tripathy*, and Biswajit Dey, "Comparative Vision of Nonlinear Thermo-Optical Features and Third-Order Susceptibility of Mechanically Flexible Metallosupramolecular Self-Repairing Networks with Isomeric Organic Acids," **Inorganic Chemistry**, 63(26), 12003-12016 (2024).
8. Nitesh Kumar Pathak, Priyadarshi Sahoo, and *Umakanta Tripathy*, "Nonlinear study of indolamines: A hidden property that might have possible implications in neurodegeneration," **Talanta**, 272, 125808 (2024).

9. Priyadarshi Sahoo, Nitesh Kumar Pathak, D. Scott Bohle, Erin L. Dodd, and **Umakanta Tripathy**, “Hematin anhydride (β -hematin): An analogue to malaria pigment hemozoin possesses nonlinearity,” **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 310, 123902 (2024).
10. Nandeshwar, Janmejaya Rout, Smita Manjari Panda, and **Umakanta Tripathy**, “Phytoconstituents of Ashwagandha as potential inhibitors of human islet amyloid polypeptide (hIAPP): An in-silico investigation”, **Journal of Biomolecular Structure and Dynamics**, 42, 11020-11036, (2024).
11. Indrajit Pal, Nitesh Kumar Pathak, Santanu Majumdar, Gerald Lepcha, Amiya Dey, Suresh Kumar Yatirajula, **Umakanta Tripathy**, and Biswajit Dey, “Solvent-driven variations of third-order nonlinear thermo-optical features of glutaric acid-directed self-healing supramolecular Ni(II)-metallogeles”, **Langmuir**, 39, 16584-16595 (2023).
12. Nitesh Kumar Pathak, Sunil Kumar Verma, and **Umakanta Tripathy**, “Effect of hemoglobin in the nonlinearity of O⁺ blood group”, **Asian Journal of Physics**, 31(1), 123-128 (2022).
13. Nitesh Kumar Pathak, Lata Sharma, Sakshi, Bijayalaxmi Panda, and **Umakanta Tripathy**, “Synthesis, characterization, and investigation of nonlinear property of fly ash-red mud-Ag: A low-cost sustainable nanocomposite”, **Optical Materials**, 126, 112230 (2022).
14. Sakshi, Bikash Chandra Swain, Anand Kant Das, Nitesh Kumar Pathak, and **Umakanta Tripathy**, “Z-scan analysis and theoretical studies of dopamine under physiological conditions”, **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 271, 120890 (2022).
15. Bikash Chandra Swain, Janmejaya Rout, and **Umakanta Tripathy**, “Interaction of vitamin B12 with β -lactoglobulin: A computational study”, **Journal of Biomolecular Structure and Dynamics**, 40(5), 2146-2155 (2022).
16. Janmejaya Rout, Bikash Chandra Swain, and **Umakanta Tripathy**, “In Silico Investigation of Spice Molecules as Potent Inhibitor of SARS-CoV-2”, **Journal of Biomolecular Structure and Dynamics**, 40(2), 860-874 (2022).
17. Sakshi, Bikash Chandra Swain, Anand Kant Das, Nitesh Kumar Pathak, and **Umakanta Tripathy**, “Norepinephrine exhibits thermo-optical nonlinearity under physiological conditions”, **Physical Chemistry Chemical Physics**, 23, 23473-23477 (2021).
18. Janmejaya Rout, Bikash Chandra Swain, Suchismita Subadini, Padmaja Prasad Mishra, Harekrushna Sahoo, and **Umakanta Tripathy**, “Conformational dynamics of myoglobin in the presence of vitamin B12: A spectroscopic and in silico investigation,” **International Journal of Biological Macromolecules**, 192, 564-573 (2021).

19. Janmejaya Rout, Bikash Chandra Swain, Suchismita Subadini, Padmaja Prasad Mishra, Harekrushna Sahoo, and **Umakanta Tripathy**, “Spectroscopic and computational insight into the conformational dynamics of hemoglobin in the presence of vitamin B12”, **International Journal of Biological Macromolecules**, 189, 306-315 (2021).
20. Sunil Kumar Verma, Janmejaya Rout, Shrutidhara Biswas, and **Umakanta Tripathy**, “Association of the Types of Alcoholic Beverages and Blood Lipids: A Community-Based Study”, **Proceedings of the National Academy of Sciences, India Section B: Biological Sciences**, 91, 73-80 (2021).
21. Sabera Millan, Bikash Chandra Swain, **Umakanta Tripathy**, Padmaja Prasad Mishra, and Harekrushna Sahoo, “Effect of micro-environment on protein conformation studied by fluorescence-based techniques,” **Journal of Molecular Liquids**, 320, 114489 (2020).
22. Sumanta Ghosh, Sakshi, Bikash Chandra Swain, Ritobrita Chakraborty, **Umakanta Tripathy**, and Krishnananda Chattopadhyay, “A novel tool to investigate the early and late-stages of alpha-synuclein aggregation”, **ACS chemical neuroscience**, 11, 1610-1619 (2020).
23. Bikash Chandra Swain, Sandip Kumar Mukherjee, Janmejaya Rout, Sakshi, Padmaja Prasad Mishra, Mandira Mukherjee and **Umakanta Tripathy**, “A Spectroscopic and Computational Intervention of Interaction of Lysozyme with 6-Mercaptopurine”, **Analytical and Bioanalytical Chemistry**, 412, 2565-2577 (2020).
24. Janmejaya Rout, Bikash Chandra Swain, Padmaja Prasad Mishra, and **Umakanta Tripathy**, “Spectroscopic insight into the interaction of dopamine with spherical gold nanoparticles”, **Journal of Photochemistry and Photobiology B: Biology**, 203, 111770 (2020).
25. Bikash Chandra Swain, Suchismita Subadini, Janmejaya Rout, Sakshi, Padmaja Prasad Mishra, Harekrushna Sahoo and **Umakanta Tripathy**, “Biophysical study on complex formation between β -Lactoglobulin and Vitamin B12”, **Food Chemistry**, 312, 126064 (2020).
26. Janmejaya Rout, Bikash Chandra Swain, Sakshi, Shrutidhara Biswas, Anand Kant Das and **Umakanta Tripathy**, “A simulation study on the influence of energy migration and relative interaction strengths of homo- and hetero-FRET on the net FRET efficiency”, **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 226, 117599 (2020).
27. Sakshi, Nitesh Kumar Pathak, Bikash Chandra Swain and **Umakanta Tripathy**, “Analyzing nonlinear trends in curcumin: A comparative study”, **Optics & Laser Technology**, 121, 105822 (2020).
28. Sakshi, Bikash Chandra Swain, Anand Kant Das and **Umakanta Tripathy**, “Probing third-order nonlinearity in serotonin: A Z-scan study”, **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 223, 117319 (2019).
29. Srabani Karmakar, Shrutidhara Biswas, Kali. P. Das and **Umakanta Tripathy**, “Surface plasmon resonance study of the interaction of 4,4'-Dianilino-1,1'-binaphthyl-5,5'-disulfonic acid dipotassium salt (bis-ANS) and adenosine triphosphate (ATP) with oligomeric

- recombinant human lens α A-crystallin”, **Canadian Journal of Chemistry**, 97, 504-511 (2019).
30. Navin Chandra, Shrutidhara Biswas, Janmejaya Rout, Gautam Basu, and **Umakanta Tripathy**, “Stability of β -turn in LaR2C-N7 peptide for its translation-inhibitory activity against hepatitis C viral infection: A molecular dynamics study”, **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 211, 26–33 (2019).
 31. Bikash Chandra Swain, Padmaja P. Mishra, Hirdyesh Mishra, and **Umakanta Tripathy**, “Monitoring the binding of Serotonin to Silver nanoparticles: A Fluorescence Spectroscopic investigation”, **Journal of Photochemistry and Photobiology A: Chemistry**, 367, 219-225 (2018).
 32. **Umakanta Tripathy**, S. Rallabandi, P. B. Bisht, “Switching the sign of nonlinear refraction in N, N’-Bis (2, 5,-di-tert-butylphenyl)-3, 4, 9, 10-perylenedicarboximide (DBPI),” **Optics & Laser Technology**, 99, 411-414 (2018).
 33. A. K. Das, B. K. Maity, D. Surendran, **Umakanta Tripathy**, S. Maiti, “Label-Free Ratiometric Imaging of Serotonin in Live Cells,” **ACS chemical neuroscience**, 8 (11), 2369-2373 (2017).
 34. **Umakanta Tripathy**, Sailaja Rallabandi, and Prem B. Bisht, “Experimental and theoretical simulation studies on picosecond closed-aperture Z-scan profiles of N,N’-Bis(2,5,-di-tert-butylphenyl)-3,4,9,10-perylenedicarboximide (DBPI)”, **Optical Materials**, 72, 233-240 (2017).
 35. Bidyut Sarkar, Arkarup Bandyopadhyay, Anand K. Das, Suman Nag, Sanjeev K. Kaushalya, **Umakanta Tripathy**, Mohammed Shameem, Shubha Shukla, and Sudipta Maiti, “Label-free dopamine imaging in live rat brain slices”, **ACS Chem. Neuroscience**, 5(5), 329-334 (2014).
 36. Hossein K. Heris, Amir K. Miri, **Umakanta Tripathy**, Francois Barthelat, and Luc Mongeau, “Indentation of poroviscoelastic vocal fold tissue using atomic force microscopy,” **Journal of the mechanical behavior of biomedical materials**, 28, 383-392 (2013).
 37. Amir K. Miri, Hossein K. Heris, **Umakanta Tripathy**, Paul W. Wiseman, and Luc Mongeau, “Microstructural characterization of vocal folds toward a strain energy-model of collagen remodeling,” **Acta Biomaterialia**, 9(8), 7957-7967 (2013).
 38. **Umakanta Tripathy**, Maxime Giguère-Bisson, Mohammad Hussain Sangji, Marie-Josée Bellemare, D. Scott Bohle, Elias Georges, and Paul W. Wiseman, “Optimization of malaria detection based on third harmonic generation imaging of hemozoin,” **Analytical and Bioanalytical Chemistry**, 405(16), 5431-5440 (2013).
 39. Amir K. Miri, **Umakanta Tripathy**, Luc Mongeau, and Paul W. Wiseman, “Nonlinear Laser Scanning Microscopy of Human Vocal Folds,” **The Laryngoscope**, 122(2), 356-363 (2012).

40. Jędrzej Szmytkowski, Sophie M. K. Brunet, **Umakanta Tripathy**, Jaclyn A. O'Brien, Matthew F. Paige, and Ronald P. Steer, "Photophysics and Halide Quenching of Soret-excited ZnTPPS⁴⁻ in Aqueous Media," **Chem. Phys. Letters**, 501(4-6), 278-282 (2011).
41. Sunish K. Sugunan, **Umakanta Tripathy**, Sophie M. K. Brunet, Matthew F. Paige, and Ronald P. Steer, "Mechanisms of low-power Noncoherent Photon Upconversion in Metalloporphyrin-Organic Blue Emitter Systems in solution," **Journal of Phys. Chem. A**, 113(30), 8548-8556 (2009).
42. Dorota Kowalska, Xia Liu, **Umakanta Tripathy**, Atif Mahammad, Zeev Gross, Satoshi Hirayama, and Ronald P. Steer, "Ground- and Excited State Dynamics of Aluminum and Gallium Corroles," **Inorganic Chemistry**, 48(6), 2670-2676 (2009).
43. Jaclyn O'Brien, Sailaja Rallabandi, **Umakanta Tripathy**, Matthew F. Paige, and Ronald P. Steer, "Efficient S₂ state production in ZnTPP-PMMA thin films by triplet-triplet annihilation: Evidence of solute aggregation in photon upconversion systems," **Chem. Phys. Letters**, 475(4-6) 220-222 (2009).
44. Xia Liu, **Umakanta Tripathy**, Sheshanath V. Bhosale, Steven J. Langford, and Ronald P. Steer, "Photophysics of Soret-Excited Tetrapyrroles in Solution. II. Effects of Perdeuteration, Substituent Nature and Position, and Macrocycle Structure and Confirmation in Zinc (II) Porphyrins," **Journal of Phys. Chem. A**, 112(38), 8986-8998 (2008).
45. Xia Liu, Atif Mahammad, **Umakanta Tripathy**, Zeev Gross, and Ronald P. Steer, "Photophysics of Soret-Excited Tetrapyrroles in Solution. III. Porphyrin Analogues: Aluminum and Gallium Corroles," **Chem. Phys. Letters**, 459(1-6), 113-118 (2008).
46. **Umakanta Tripathy**, Dorota Kowalska, Xia Liu, Suresh Velate, and Ronald P. Steer, "Photophysics of Soret-Excited Tetrapyrroles in Solution. I. Metalloporphyrins: MgTPP, ZnTPP and CdTPP," **Journal of Phys. Chem. A**, 112(26), 5824-5833 (2008).
47. **Umakanta Tripathy**, and Prem B. Bisht, "Influence of pulsed and cw pumping on optical nonlinear parameters of laser dyes probed by a closed-aperture Z-scan technique," **Journal of Optical Society of America B**, 24(9), 2147-2156 (2007).
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2. Shrutidhara Biswas, Vlad Bogdan Gavra, Anand Kant Das and **Umakanta Tripathy**, (2019) "Biophotonics in Disease Diagnosis and Therapy." In: Paul S. (eds) Biomedical Engineering and its Applications in Healthcare. Springer, Singapore. https://doi.org/10.1007/978-981-13-3705-5_3.
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INVITED TALKS

1. **Umakanta Tripathy**, “Sensing biomolecules for disease diagnosis through a novel optical device”, 1st International Conference on Emerging Trends in Optical Technologies (ETOT-I), SRM University, Amaravati, Andhra Pradesh, 2nd – 4th January **2025**.
2. **Umakanta Tripathy**, “Introducing a novel optical device to study protein aggregation in real-time”, International Conference on Optics Within Life Sciences (OWLS-2024), Indian Institute of Technology Bombay (IITB), Mumbai, Maharashtra, 18th – 21th November **2024**.
3. **Umakanta Tripathy**, “Presenting A Nonlinear Switch To Identify The Toxic Species In Parkinson’s Disease”, International Conference on Smart Materials for Sustainable Technology (SMST-2024) Institute of Nano Science and Technology (INST), Mohali, Punjab, 24th – 27th October **2024**.
4. **Umakanta Tripathy**, “Nonlinear Magic in Soft Matter Physics”, Refresher Course on Advanced Concepts in Biophysics and Soft Matter: Foundations and Frontiers, IIT (ISM) Dhanbad, Jharkhand, 18th – 29th October **2024**.
5. **Umakanta Tripathy**, “Phytoconstituents of Ashwagandha as potent inhibitors of BRCA1 Mutants: A Therapeutic against Breast Cancer”, Refresher Course on Advanced Concepts in

Biophysics and Soft Matter: Foundations and Frontiers, IIT (ISM) Dhanbad, Jharkhand, 18th – 29th October **2024**.

6. **Umakanta Tripathy**, “A Potential Therapeutic Against Breast Cancer From Natural Resources”, International Conference on Recent Developments in Functional Materials for Sustainable Applications (RDFMSA-2024), GIET University, Gunupur, Odisha, 20th – 21st April **2024**.
7. **Umakanta Tripathy**, “A Novel Approach For Disease Diagnosis Through Nonlinear Magic”, National Conference on Recent Trends in Chemical Sciences (RETICS-2024), Sambalpur University, Sambalpur, Odisha, 1st – 3rd March **2024**.
8. **Umakanta Tripathy**, “Applications of Nonlinear Optics in Biophysics”, Dept. of Physics, Mahila Maha Vidyalaya (MMV), BHU, Varanasi, Uttar Pradesh, 3rd February **2024**.
9. **Umakanta Tripathy**, “Withania somnifera as a potent inhibitor of mutant BRCA1: A therapeutic against breast cancer”, International Conference on Translational Materials for Sustainable Research (TransMat 2k24), Dept. of Physics, IIT(BHU) Varanasi, Uttar Pradesh, 1st – 4th February **2024**.
10. **Umakanta Tripathy**, “Applications of the Z-scan Technique in Soft Condensed Matter Physics”, One Week Training Programme on Synthesis and Characterization of Nanomaterials for Energy, Lighting & Bio-imaging Applications under STUTI, IIT(ISM) Dhanbad, Jharkhand, 7th – 13th November **2022**.
11. **Umakanta Tripathy**, “Z-scan Technique: A Novel Tool for Biomedical Applications”, National Workshop on Lasers and Z-scan Experiments, Bharathidasan University, Tiruchirappalli, Tamilnadu, 26th – 27th August **2022**.
12. **Umakanta Tripathy**, “Interaction Between Spice Molecules and SARS-Cov-2 Proteins: A Computational Study”, 38th Annual Convention of Odisha Physical Society and National seminar on Physics in sustainable development, GIET University, Gunupur, Odisha, 4th -5th June **2022**.
13. **Umakanta Tripathy**, “Spice molecules: Potential inhibitors of SARS-CoV-2”, One Day Seminar, Baghmara College, Baghmara, Jharkhand, 26th March **2022**.
14. **Umakanta Tripathy**, “Parkinson’s disease Pathology: Introducing a novel optical device for diagnostics”, National Science Day, GIET University, Gunupur, Odisha, 28th February **2022**.
15. **Umakanta Tripathy**, “A novel drug for covid19: an In Silico Investigation”, A Physics Refresher Course with special focus on Material Science and Biophysics under TEQIP-III, IIT(ISM) Dhanbad, 8 - 20 February **2021**.

16. **Umakanta Tripathy**, “A novel tool to study the aggregation kinetics of Alpha-Synuclein Protein”, One day national E-conference on Recent Progress in Physical Sciences, Department of Physics, Tarakeswar Degree College, West Bengal, 31 August **2020**.
17. **Umakanta Tripathy**, “A novel tool to help gain deeper insight into Parkinson’s disease”, Webinar by Society of Physics, Department of Physics, IIT(ISM) Dhanbad, 09 July **2020**.
18. **Umakanta Tripathy**, “An Overview of Nonlinear Optical Tools in Neurodegenerative Diseases”, Science Seminar, NAC Nayagarh, 12 – 13 February **2020**.
19. **Umakanta Tripathy**, “Nonlinear Magic with Monoamine Neurotransmitters”, National Symposium on light-matter interactions, IIT Madras, 26 December **2019**.
20. **Umakanta Tripathy**, “Pros and Cons in Power Point Presentation”, Induction Training / Orientation Programme for teachers, IIT(ISM) Dhanbad, 15 November – 12 December **2019**.
21. **Umakanta Tripathy**, “Nonlinear Techniques in Biomaterials”, Faculty development programme on design and development of materials for technological applications, VSSUT Burla, 21 - 26 October **2019**.
22. **Umakanta Tripathy**, “Fundamentals and Applications of Spectroscopic Tools”, Faculty development programme on design and development of materials for technological applications, VSSUT Burla, 21 - 26 October **2019**.
23. **Umakanta Tripathy**, “Nonlinear Techniques in Biophotonics”, Refresher programme in Physics (Biophotonics) for teachers, IIT(ISM) Dhanbad, 29 May – 18 June **2018**.
24. **Umakanta Tripathy**, “Art of Slide Presentation”, National Training programme on Research Methodology for research scholars, IIT(ISM) Dhanbad, 18 – 23 December **2017**.
25. **Umakanta Tripathy**, “Sensitive detection of malaria infection by using nonlinear imaging”, 22nd Biennial Indian Photobiology Society (IPS) Conference on Biomolecular Dynamics- Experimental and Theoretical Perspectives (BDETP-2017), NIT Rourkela, 18 - 20 December **2017**, IL2, P-19.
26. **Umakanta Tripathy**, “Nonlinear Laser Scanning Microscopy (NLSM) for Bio-imaging”, Refresher programme in Physics (Nano-Biotechnology) for teachers, IIT(ISM) Dhanbad, 25 May – 14 June **2017**.
27. **Umakanta Tripathy**, “Origin of Maxwell’s equations and its magic in linear media”, Refresher programme in recent trends on microwave components and Antennas for teachers, IIT(ISM) Dhanbad, 26 December **2016** – 15 January **2017**.
28. **Umakanta Tripathy**, “An Innovative Tool For Disease Diagnosis”, Orientation Programme for teachers, IIT(ISM) Dhanbad, 9 – 29 February **2016**.