



Curriculum vita of Dr. A. K. Rai

1. **Name:** Dr. Awadhesh Kumar Rai
2. **Designation:** Professor (Cadre),
3. **Address:** Office Department of Physics, University of Allahabad, Allahabad, INDIA
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Residence: G-102, Narayan Apartment, 23/1 M. Z. H. Road, In front of
Commissioner Office, Katra, Allahabad
Tel 0532-2642895, 9335110163 (Mob)
4. **Date & Place of Birth:** 01.01.58, First January Nineteen Fifty-Eight
5. **Qualifications:**
 - (i) M. Sc. (Physics), Ph. D.
 - (ii) **Research Interest:** Experimental Laser Spectroscopy; Study of multifarious materials like plant materials, biomaterials, energetic materials, archeological objects, geological specimens, and food materials and monitoring of toxic and heavy elements in different industrial wastes like soil, water plants, and plant products using Laser Induced Breakdown Spectroscopy, Photoacoustic spectroscopy, Laser Optogalvanic Spectroscopy, Laser Induced Fluorescence
6. **Distinctions/Prize/Medal/Award/Honors:**
 - i) Member (Governor Nominee) Executive Council, Goa University, Goa
 - ii) Elected to deliver Platinum Jubilee Lecture in Physical Science Section 102nd Indian Science Congress held at Mumbai University during January 3-7, 2015.
 - iii) Elected as Vice President of the Laser and Spectroscopy Society Of India (LASSI) in the general body of LASSI held in the International Workshop & Conference on Frontiers of Spectroscopy at Banaras Hindu University, 8-12 January 2015
 - iv) Elected as President of the Physical Science Section of the Indian Science Congress Association in 2012 (100th Session)
 - v) Elected as a Fellow of the Laser and Spectroscopy Society of India 2011-2012
 - vi) Elected as Visiting Fellow in Physics, School of Physical Sciences, Swami Ramanand Teerth Marathwada University, Vishnupuri, Nanded-431606
 - vii) Elected as a Member of the Optical Society of America 2011-2012
 - viii) Elected as Recorder of the Physical Science Section for 2010-2011 & 2011-2012 (98th and 99th Sessions) of the Indian Science Congress Association
 - ix) Biography was listed in Marquis Who's Who in Science and Engineering-2009, 26th Edition (Pub. 2008), Marquis Publishers, New Jersey, U.S.A.
 - x) Elected as a Member of the National Academy of Sciences, India (M.N.A.Sc.).
 - xi) Visiting Research Scientist/Visiting Research Professor at Mississippi State University, USA, May 2000 - May 2002.
 - xii) Selected as a participant in Winter School on Atomic & Mol. Physics at I.C.T.P., Trieste, Italy, 1987
 - xiii) Selected as a participant in the College on "Methods and Experimental Techniques in Biophysics at I.C.T.P., Trieste, Italy 1992
 - xiv) ISCA "Young Scientist Award 1987"
 - xv) Max. Planck (Germany) Post-Doctoral fellowship 1984-85
 - xvi) Selected as UGC Research Scientist "A" 1988

- xvii) Vijay Shree Award by India International Friendship Society
- xviii) Medal of the Indian Phytopathological Society 2000 for the best paper presentation.
- xix) Distinction Math in High School Examination
- xx) Certificate of Merit for presenting a research paper at Mysore in 1982

7. Member of the Academic Society

- i) Member of the Optical Society of America for one year (2011)
- ii) Life member of “**National Academy of Sciences India**”
- iii) Life member of “**Laser and Spectroscopy Society of India**”
- iv) Life member of “**Indian Laser Association**”
- v) Life member of “**Indian Science Congress Association**”
- vi) Life member of “**High Energy Materials Society of India**”
- vii) Member of the Board of Study for Physics Uttara Khand Open University, Haldwani
- viii) Member of the board of studies for the subject Physics, Maharishi University of Information Technology Maharishi Bal Vidya Mandir & University Campus, Sitapur Road, Lucknow-226020

8. Employment Record

Designation	Grade	Name of Employer	Date of joining/leaving	Reason for leaving
Research Scholar	Fellowship (JRF/SRF)	UGC/CSIR Place; BHU, Varanasi	March 1979 to June 1984	-
Max - Planck Post-Doctoral fellow	DM 2400/- per month	Max Planck Institute Munich, Germany	June 1984 to July 1985	Fixed Tenure
3. Pool Officer	Rs.2200-4000/- per month	CSIR: Place- BHU, Varanasi	15 Oct. 1985 to 8 March 1988	Time Bound
Assistant Professor	Rs 10,000-325-15,200/-	G. B. Pant Univ. Pantnagar	8 March 1988 to 26 July 1998.	-
Visiting Scientist/ Visiting Research Professor	\$ 40,000.00 Per year	Mississippi State Univ. USA	10 May 2000 to 10 May 2002	On leave from Pantnagar
Associate Professor	Rs. 12,000-420-18,300	G.B.Pant Univ. Pantnagar	27 July 1998 to 25 Feb 2004	Promotion
Professor	Rs. 16400-450-22400	University of Allahabad	26, February 2004-31.12.2022Continue	Retired

9. Academic Records - Matriculation onwards

Exam	Univ./Board	Year	Subjects
High School	U.P. Board	1972	Hindi, Eng. Bio, Math, Science
Intermediate	U.P. Board	1974	Hindi, Eng. Math, Physics, Chem.
B.Sc.	Sambalpur University	1976	Physics, Chemistry, Math
M.Sc.	B.H.U. Varanasi	1978	Physics (Spectroscopy)
Ph.D.	B.H.U. Varanasi	1983	Physics (Spectroscopic studies of Diatomic Mercury halides).

10. Teaching Experience (in years): Post Graduate: 33 years, Under Graduate: 36 years

11. Research experience (in years) More than 42 years

12. Experience in guiding Research: 35 years

13. Number of Ph. D. Students guided. 23

S.	Name of student	Title of thesis	Year of the Ph. D. Degree awarded
1	Jagdish Chandra Kapil	Investigations of optical and thermal properties of snow and ice using photoacoustic spectroscopy	2003
2	Hukum Singh	Studies on certain selected materials with photoacoustic spectroscopy	2003
3	Shiwani Pandhija	Development of Laser-induced breakdown spectroscopy for the measurements of toxic elements in solid and liquid samples	2009
4	Nilesh Kumar Rai	Study of Different Materials using Laser Spectroscopic Techniques	2009
5	Vivek Kumar Singh	Study of Some Biological Specimens by using Laser Spectroscopic Techniques	2009
6	Abhimanyu K. Singh	Synthesis and Characterization of Bulk and Nano-materials using different Techniques	2010
7	Shikha Rai	Spectroscopic Study of Some Selected Energetic Materials	2011
8	Ashok Kumar Pathak	Life Science Applications of Laser Induced Breakdown Spectroscopy	2013
9	Rahul Agrawal	Spectroscopic Study of Some food Material	2014
10	Rohit Kumar	Study of Samples Collected from Industrial Area using Spectroscopic Techniques	2014
11	Gulab Singh Maurya	Study of impurities deposited on the surface of different parts of the Aditya Tokamak using Laser Induced Breakdown Spectroscopy	2015
12	Shikha Awasthi	Multivariate analysis of LIBS spectra of different materials	2017
13	Vinti Singh	Physicochemical and spectroscopic study of different food products developed from Madhuka species.	2019
14	Pravin Kumar Tiwari	Study of Pharmaceutical Sample using Spectroscopic Techniques	2019
15	Jyotsana Singh	Monitoring of Nutrients and Functional Components in Cucurbits for the Development of Value-Added Products	2020
16	Zainab Gazali	Study of materials of biological interest using different spectroscopic techniques	2022

17	Sonali Dubey	Study of Geological Materials using Laser-induced Breakdown Spectroscopy	10 May 2023
18	Pratima Mishra	Evaluation of the Analytical techniques for the analysis of Different Materials	16 August 2023
19	Tejmani Kumar	Study of Edible Materials Using Spectroscopic Techniques	14.09.2023
20	Vineet Kumar Shukla	Relative Abundance of the Elements in Terrestrial Material Using Various Spectroscopic Techniques	04.01.2024
21	Reshu kumari	Compositional analysis of materials using different spectroscopic techniques	05.01.2024
22	Derpan Dubey	Compositional Study of Perilous Materials Using Spectroscopic Techniques	18.01.2024
23	Vikash Gupta	Analysis of LIBS spectra of different materials by using Chemometric methods	Final Viva-voce awaited

14. Publications: (For details, see list of publications Annexure 2)

1. Patent	01
2. Papers published in Foreign Journals	150
3. Papers published in Indian Journals	50
4. Papers published as Chapters in books	19
5. Papers published in bulletins:	18
6. Papers Communicated	05
7. Papers published in Proceedings of Conferences/symposium	80
8. Chaired Sessions and Deliver Invited Talks in the national and International conference/workshop/refreshers course:	87

15. Research projects

As Principal Investigator

Title of the Project	Funding Agency	Approximate Amount	Duration
On-line analysis of impurities coated on optical windows and the first wall of Aditya Tokamak using LIBS, 39/14/30/2016-BRNS	BRNS	Rs 11.63	01/06/2017-31/03/2019
Investigation and quantification of deposited materials on tokamak vacuum vessel wall, windows, and limiter using Laser Induced Breakdown Spectroscopy (LIBS)	BRFST, IPR, Gandhinagar	Rs 73.96 lakhs	May, 2011- March, 2015
Development of optical probe for detection and quantification of Cr species in water	BRNS (DAE), Bombay	Rs 24.85 lakhs	February 2010- March 2014
Detection of pollutants in snow and ice by Laser-Induced Breakdown Spectroscopy for the detection of licit, dangerous, and toxic material	SASE-DRDO, Chandigarh	Rs 8.99 lakhs	21.5.08-21.1.10
Development of Laser-Induced Breakdown Spectroscopy for the detection of licit, dangerous, and toxic material.	DRDO, New Delhi	Rs. 37.9 lakhs	2005 to 08

Diagnosis of Plants Diseases with Photoacoustic Spectroscopy	D.S.T., New Delhi	Rs. 15 lakhs	1999 to 2001.
Studies of Physical Properties of Snow with Photoacoustic Spectroscopy	DRDO, New Delhi	Rs 16 lakhs	1999 to 2003
Development of Photoacoustic Spectroscopic Technique and Studies of Biomolecules	CSIR, New Delhi	Rs. 5 lakhs	1991 to 1994
Spectroscopic studies of Medicinal plants (Cymbopogon Species)	Directorate of the Experiment Station, G.B.P.U., Pantnagar	Minor	1994-1997
Spectroscopic studies of Medicinal plants (Mint oil)	do	Minor	1989-92

16. Administrative Experience

- (i) Director, Institute of Professional Studies, University of Allahabad, Prayagraj, 04.08.2020-07.12.2020.
- (ii) Dean, Research and Development, University of Allahabad, Prayagraj, 06.02.2020-04.12.2020
- (iii) Head Department of Physics, University of Allahabad, Allahabad, July 2017-July 2019.
- (iv) Coordinator UGC CAS, Department of Physics, University of Allahabad July 2017-
- (v) Member (Governor Nominee) of the executive council Committee, University of Goa, 10.04.2018- November 2020
- (vi) Member, Board of Studies, Department of Engineering Physics, VBS Paranuchal University, Jaunpur
- (vii) Member, Board of Studies, Department of Physics, APS University, Rewa
- (viii) In charge M. Sc. Physics General Laboratory, Department of Physics, University of Allahabad 2017- Continue
- (ix) In charge M. Sc. II Physics X-Ray laboratory, Department of Physics, University of Allahabad 2013- Continue
- (x) In charge Workshop, Department of Physics, University of Allahabad 2012- Continue
- (xi) Timetable In charge of the Department of Physics, University of Allahabad
- (xii) In charge of B. Sc. II Physics laboratory, Department of Physics, University of Allahabad
- (xiii) Overall Chairman to conduct B. Sc. I Physics Practical Examination for the Session 2006-7 and 2008-9 of the University of Allahabad
- (xiv) Overall Chairman to conduct B. Sc. III Physics Practical Examination for the Session 2007-8 of the University of Allahabad
- (xv) Overall Chairman to conduct B. Sc. II Physics Practical Examination for the Session 2012 of the University of Allahabad

17. Organizing Experience

- (i) **Convener and Chairman** of “Second Meghnad Saha Memorial International Symposium-cum-workshop on Laser Induced Breakdown Spectroscopy” held at Department of Physics, University of Allahabad, Allahabad 19-21 Feb. 2018
- (ii) **Sectional President** of Physical Science of 100th Session of the Indian Science Congress Association held at Calcutta University, Kolkata during 4-7 Jan. 2013.
- (iii) **Recorder** of the Physical Science Section of the 98th and 99th Session of the Indian Science Congress Association held at SRM University, Chennai during 4-7 Jan. 2011.
- (iv) **Organizing Secretary** of the VII Saha Memorial Lecture and VI Saha Memorial Seminar on Astrophysics,” at Department of Physics University of Allahabad, Allahabad, Feb. 22, 2011
- (v) **Convener** of the Meghnad Saha Memorial International Symposium cum Workshop on “Laser Induced Breakdown Spectroscopy” at the Department of Physics University of Allahabad, Allahabad during Dec. 21-23, 2010
- (vi) **Convener** of the Meghnad Saha Memorial Seminar on “Emerging Trends in Laser & Spectroscopy and Applications” at the Department of Physics University of Allahabad, Allahabad during March 19-21, 2009
- (vii) **Convener** of the Symposium on “Laser Spectroscopy, Ion Beam and New Material” Organized

under the banner of “An International Conference on Emerging Frontiers in Physical Sciences” in the Department of Mathematics, the University of Allahabad during December 21-23, 2004

18. Innovation/Contribution to Teaching and Research

- (i) I had set up a new experimental research facility in the area of **Laser Optogalvanic Spectroscopy** during my Pool Scientist tenure (Oct 1985-March 1988) at B.H.U., Varanasi.
- (viii) I had set up an experimental research facility in the area of **Photoacoustic spectroscopy** during my faculty position (Assistant and Associate Professor) tenure (March 1988-Feb 2004) at G.B. Pant University of Ag. & Tech Pantnagar.
- (ix) I had developed a "**Fiber Optic Laser Induced Breakdown Spectroscopy Probe for Elemental analysis of Aluminum alloy**" during my Visiting Research Scientist tenure (May 2000-April 2002) at Mississippi State University, USA.
- (x) I have set experimental facility in the area of **Laser-Induced Breakdown Spectroscopy** for the study of liquid, solid, and biomaterial at the University of Allahabad

19. Invited Talk Delivered in

- (a) **Foreign Countries (USA, Italy, Ethiopia): 24**
- (b) **In India: 56**

20. Invitation/Participation in Conference/Workshop in the Foreign Countries

- (i) Selected as a participant in Winter School on Atomic & Mol. Physics at I.C.T.P., Trieste, Italy, 1987
- (ii) Selected as a participant in the College on “Methods and Experimental Techniques in Biophysics at I.C.T.P., Trieste, Italy 1992.
- (iii) International Laser Science Conference III at Atlanta City, New Jersey, U.S.A November 1987
- (iv) 27th Annual Conference of the Federation of Analytical Chemistry of Spectroscopy Society, held at Nashville, Tennessee, USA, September 24-28, 2000.
- (v) PITTCON held at New Orleans, LA, USA, March 4-9, 2001.
- (vi) 56th Ohio State University International Symposium on Molecular Spectroscopy, held at Ohio State University, Columbus, USA, June 11-15, 2001.
- (vii) 28th Annual Conference of the Federation of Analytical Chemistry of Spectroscopy Society, held at Detroit, Michigan, U.S.A.; October 7-12, 2001.
- (viii) Laser Applications to Chemical and Environmental Analysis held at Boulder, Colorado, USA; February 6 – 10, 2002.
- (ix) 8TH Joint MMM-Intermag Conference held at San Antonio, Texas, USA, and January 7-11, 2001
- (x) Remote Sensing and Modeling Applications for Natural Resource Management held at Mississippi State University, USA; March 10-13, 2002.
- (xi) PITTCON held at New Orleans, LA, USA, March 17-22, 2002.
- (xii) 23rd American Chemical Society, National Meeting, Orlando, Florida, USA, April 7-11, 2002.
- (xiii) First North American Symposium on Laser-Induced Breakdown Spectroscopy, Organized by Mississippi State University, USA, during 8-10 October 2007.
- (xiv) 6th International Conference on Laser-Induced Breakdown Spectroscopy organized by Mississippi State University, USA, **13-17, Sep 2010,**
- (xv) Laser-Induced Breakdown Spectroscopy in Life Science in Pittcon 2014, Conference on “Recent Advances in Laser-Induced Breakdown Spectroscopy” held in Chicago, Illinois, USA during 3-6 March 2014.
- (xvi) Pittcon 2020, International Annual Pittsburg Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, USA during March 1 - 5, 2020.
- (xvii)

21. Reviewer/Evaluator

- (i) Referee of the journal- Laser in Medical Science, Current Science, Journal of Hazardous Materials, Applied Optics, Appl. Physics B

- (ii) Examiner of the Ph. D. Thesis- BARC, DRDO, Addis Ababa University Ethiopia, University of Delhi, University of Madras, University of Jammu, Rohilkhand University Bareilly, Dr. Hari Singh Gour University Sagar, HNB Garhwal University Srinagar, Ch. Charan Singh University Meerut, Pariyar University Salem, University of Kolhapur, APS University, Rewa

22. Conferences/Seminars attended/Paper Presented:

- (i) I attended nearly 70 conferences/seminars, including eight conferences in the U.S.A., and had presented papers and in some conferences delivered invited talks (See Appendix -2)
- (ii) Resource Person in the Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi
- (iii) Resource Person in the refresher Course on “New Horizons in Botanical Sciences” Organized by the Department of Botany, University of Allahabad, Allahabad from 4th- 24th Nov. 2010.

Lectures Delivered in Foreign Countries

1. Laser-Induced Breakdown Spectroscopy: Application to Biomedical Sciences, Pittcon 2020, International Annual Pittsburg Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, USA during March 1 - 5, 2020.
2. Laser-Induced Plasma Spectroscopy and its Applications, University of Tennessee Space Institute, USA, 20.02.2020.
3. LIBS: On-line Quality Control Tool for drugs, Department of Physics, Adama University, Ethiopia, 28.01.2020.
4. Study of laser-produced plasma of limiter of the Aditya tokamak for detection of molecular bands, International Symposium on Molecular Spectroscopy, Champaign-Urbana, Illinois, USA, June 20-24, 2016
5. Study of deposited materials on the optical components of a toroidal chamber with magnetic coils (tokamak) using laser-induced breakdown spectroscopy, The Center for laser applications, University of Tennessee Space Institute, University of Tennessee, USA, 27 May 2016
6. Laser-Induced Breakdown Spectroscopy in Life Science in Pittcon 2014, Conference on “Recent Advances in Laser-Induced Breakdown Spectroscopy” held in Chicago, Illinois, USA during 3-6 March 2014
7. Study of Energetic Material with LIBS, Adama University, Ethiopia, 7th June 2011.
8. Calibration Free Laser-Induced Breakdown Spectroscopy, Ambo University, Ethiopia, 5th July 2011
9. Variation of Heavy Metals in Water, Soil, and Plants Using LIBS, 6th International Conference on Laser-Induced Breakdown Spectroscopy organized by Mississippi State University, USA, 13-17, September 2010
10. Spectroscopy in Material Science Department of Physics, Adama University, Ethiopia, 17 June 2010.
11. Laser-Induced breakdown spectroscopy and its Applications, Department of Physics, Addis Ababa University, Ethiopia, 16 June 2010
12. Quantitative Analysis of Gallstones Using Calibration Free LIBS, First North American Symposium on Laser-Induced Breakdown Spectroscopy, Organized by Mississippi State University, USA, 8-10 October 2007
13. A. K. Rai, R. Reddy, and J. P. Singh, (2002) Monitoring of Nitrogen and Potassium Deficiency in Plants with Photoacoustic Spectroscopy. Proc. Of The 23rd American Chemical Society, National Meeting, Orlando, FL, USA, April 7-11, 2002.

14. A. K. Rai, F. Yu Yueh, And J. P. Singh (2002) Effect of Sample-To-Lens Distance on The LIBS Signal of Al Alloy. Proc. Of the PITTCON Held at New Orleans, USA, March 17-22, 2002, Abstract No. 1236, Page 451.
15. A. K. Rai, K. R. Reddy and J. P. Singh (2002) Photoacoustic Spectroscopic Study of Nitrogen and Potassium Deficiency in Plants. Proc. Of the Remote Sensing and Modeling Applications for Natural Resource Management Held at Mississippi State University, USA, March 10-13, 2002, Page 60.
16. V. N. Rai, A. K. Rai, F. Yu Yueh, And J. P. Singh, (2002) Laser-Induced Breakdown Spectroscopy of Liquid and Solid Samples in The Presence of Magnetic Field. Proc. Of the Laser Applications to Chemical and Environmental Analysis Held at Boulder, Colorado, USA; February 6 - 10, 2002, Page 21-22.
17. A. K. Rai, F. Yu Yueh, And J. P. Singh, (2001) Effect of Sample Geometry on The Laser-Induced Breakdown Spectroscopy of Aluminum Alloy. Proc. of the 28th Annual Conference of The Federation of Analytical Chemistry of Spectroscopy Society, Held at Detroit, Michigan, U.S.A., October.7-12, 2001, Page 303.
18. S. K. Joshi, A. K. Rai, R.C. Srivastava, J. P. Singh, And D. K. Rai (2001) Optical Property and Energy Band Gap of Ni-Zn Ferrite, Proc. Of The 8TH Joint MMM-Intermag Conference Held at San Antonio, Texas, USA, January 7-11, 2001 Page 370.
19. A. K. Rai, H. Zhang, F. Yu Yueh, And J. P. Singh, (2001) Laser-Induced Breakdown Spectroscopy (LIBS) As A Process Monitor and Control Tool for The Al Melter, Proc. Of the PITTCON Held at New Orleans, USA, March 4-9, 2001, Page 585.
20. A. K. Rai, And J. P. Singh (2001) Study of Seed-Borne Pathogen of Wheat and Rice with Photoacoustic Spectroscopy. Proc of the 56th Ohio State University International Symposium on Molecular Spectroscopy. Held at Ohio State University, Columbus, USA. JUNE 11-15, 2001, RF 08, Page 188.
21. J. Young, A. Weisberg, R. Desaro, H., Zhang, A. K. Rai, F. Yu Yueh, and J. P. Singh (2000) Application of LIBS to Elemental Analysis in Molten Alloy, Proc. Of The 27th Annual Conference of The Federation of Analytical Chemistry of Spectroscopy Society, Held at Nashville, Tennessee, U.S.A., Sept.24-28, 2000, Page 202.
22. Study of Essential Oils from Medicinal and Aromatic Plants Using Spectroscopic Techniques. Proc. of the College of Methods and Experimental Techniques in Biophysics, Held at I.C.T.P., Trieste, Italy 1993
23. Kumar, V., Rai, A.K., and Rai, D.K. (1987). Optogalvanic Signal in the B-X System of HgBr; Proc. of the International Laser Science Conference III at Atlanta City, New Jersey, U.S.A. Page 372-374.
24. Laser Optogalvanic Spectroscopy of Diatomic Molecules. Proceeding of The Winter College on Atomic and Molecular Physics at I.C.T.P. Trieste, Italy (1987).

Chaired Sessions and Delivered Invited Talks by Prof A. K. RAI

1. Laser-Induced Breakdown Spectroscopy (LIBS), Invited popular Lectures organized by the Department of Physics, SPM GOVT. P. G. College Phaphamau, Prayagraj, 17.10.2023.
2. Recent Spectroscopic Techniques in Indian Universities, Celebration of Science Day, Department of Physics, CMP Postgraduate College, University of Allahabad, Prayagraj, 28.02.2023
3. LIBS: an overview of recent progress and future potential for biomedical applications, National Symposium on Laser in Biology, Medical Science, Atmospheric Science and Climate Change, Organized by Department of Physics, Udaipur Pratap Autonomous College Varanasi, March 14-15, 2022
4. Application of Laser Spectroscopy in the problems related to the human being, DBT FEST, POPULAR SCIENCE LECTURES BY EMINENT SPEAKERS, Funded By: DBT STAR COLLEGE SCHEME, C.M.P. COLLEGE, A Constituent P. G. College of University of Allahabad, Date: 17th–20th January 2022
5. भौतिकी का दैनिक जीवन में उपयोग, डीबीटी भारत सरकार की स्टार कॉलेज योजना के अंतर्गत में अंडर ग्रेजुएट के लिए लैक्चर सीरीज दिनांक उदय प्रताप कॉलेज वाराणसी, 10 जनवरी 2022
6. Recent advances in the LIBS research at the University of Allahabad, 4th Asian Symposium on Laser-Induced Breakdown Spectroscopy, Qingdao, China, October 16-20 2021,
7. Biomedical application of LIBS: Special reference to Gallbladder stones, *International Conference on Materials Science and Spectroscopy (ICMSS-21)*, Organized by Maharishi School of Science, Maharishi University of Information Technology, September 22-24, 2021
8. LIBS: A Rapid Tool for Materials Characterization, International Conference on Diverse Emerging Materials and their Applications” (ICDEMA-2021, Department of Physics, University of Lucknow, 14-15 March 2021
9. Laser-Induced Breakdown Spectroscopy: working and advantages, Refresher course in Physics, February 12-27, 2021, Department of Physics, University of Lucknow, 20.02.2021, 2.00 to 3.30 PM
10. LIBS: Materials Characterization including Geological Materials, Refresher course in Physics, February 12-27, 2021, Department of Physics, University of Lucknow, 20.02.2021, 3.30 to 5.00 PM
11. Affordable, portable rapid diagnostic tools for COVID-19: International webinar on abatement techniques and impact of COVID -19 [IWATIC], organized by An International Biannual Research Journal Physical and Environmental Science bulletin, during 23-24 May 2020
12. Role of Physics to get rid of COVID-19 and its challenges, National WEBINAR on “Challenges of

COVID-19 Pandemic and Role of Science and Technology, organized by Ishwar Saran P G College, University of Allahabad in collaboration of and NASI, Prayagraj, during 14-15 May 2020

13. Laser-Induced Breakdown Spectroscopy: Application to Biomedical Sciences, Pittcon 2020, International Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, USA during March 1 - 5, 2020.
14. Laser-Induced Plasma Spectroscopy and its Applications, University of Tennessee Space Institute, USA, 20.02.2020.
15. LIBS: On-line Quality Control Tool for drugs, Department of Physics, Adama University, Ethiopia, 28.01.2020.
16. Application of Laser-based technique for the study of Biomaterials, National Symposium on Applied Spectroscopy: Biology and Medical Science" organized by Udai Pratap College Varanasi on February, 19 & 20, 2019.
17. Spectroscopy a tool to probe matter" National Seminar on Materials Science, X, and Gamma-ray spectroscopies organized by the Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, during 29-31 March 2017.
18. Study of impurities presents inside the Tokamak chamber using LIBS, National Conference on Recent Advances in Material Science and Spectroscopy Organized by Physics Department, Mata Vaishno Devi University, Katra, Jammu & Kashmir, Feb. 15-17, 2017.
19. Study of samples of Biological importance using Laser-induced breakdown spectroscopy (LIBS), International Conference on Structure and Dynamics of Biomolecules, 27-28 Jan., department of physics, DDU University, Gorakhpur Study of impurities present inside the Tokamak chamber using LIBS
20. Experimental setup for online study of impurities on plasma-facing components of Aditya tokamak using LIBS. 25TH DAE-BRNS National laser Symposium organized at Department of Physics, School of Applied Sciences, KIIT University Bhubaneswar during 20-23 Dec. 2016
21. Study of laser-produced plasma of limiter of the Aditya tokamak for detection of molecular bands, International Symposium on Molecular Spectroscopy, Champaign-Urbana, Illinois, USA, June 20-24, 2016
22. Study of deposited materials on the optical components of a toroidal chamber with magnetic coils (tokamak) using laser-induced breakdown spectroscopy, The Center for laser applications, University of Tennessee Space Institute, University of Tennessee, USA, 27 May 2016.
23. Laser-Based Technique for in-situ, on-line Characterization of Materials, National Workshop on material synthesis, HP-HT, and use electron microscopy, organized by, 2016, National Center of Experimental Mineralogy and Petrology, University of Allahabad, 16-22, Feb. 2016.
24. Suitable Spectroscopic Technique for monitoring of toxic metals in Food, UGC Sponsored Refresher Course on "Food Safety and public health" organized by Center of Food Technology, University of Allahabad, 29 March- 18 April. 2015.
25. Deliver Platinum Jubilee Lecture in Physical Science Section of 102nd Indian Science Congress held at Mumbai University during January 3-7, 2015.
26. Laser-Induced Breakdown Spectroscopy in the International Workshop & Conference on Frontiers of Spectroscopy at Banaras Hindu University, 8-12 January 2015

27. Prof. Nand Lal Singh Memorial Lecture on “Environment pollution and its monitoring using the spectroscopic technique” Organized Annually by Vigyan Parishad, Allahabad, 1.8.2014
28. Laser-Induced Breakdown Spectroscopy in Life Science in Pittcon 2014, Conference on “Recent Advances in Laser-Induced Breakdown Spectroscopy” held in Chicago, Illinois, USA during 3-6 March 2014.
29. Principle and Advantages of LIBS in Winter School on “Advances in Laser Spectroscopy and Applications” organized by Department of Physics, BHU, Varanasi during March 22 – 28, 2014.
30. Identification and quantification of impurities deposited on the different parts of the Tokamak using LIBS in Winter School on “Advances in Laser Spectroscopy and Applications” organized by Department of Physics, BHU, Varanasi during March 22 – 28, 2014.
31. Chaired a session and gave an invited lecture on “Vigilant watch on environment pollution due to toxic metals using LIBS” at the National Conference on Vistas of Environmental Awareness, organized by Department of Physics, Kashi Naresh PG College, Bhadohi, 30-31, March 2016.
32. Chaired a session and gave a talk on “Monitoring of Minerals in processed food materials using LIBS”, National Seminar on Spectroscopic Techniques and its applications for material characterization, organized by Department of Optoelectronics, University of Kerala, Thiruvananthapuram-695581, October 3-4, 2013
33. Application of Laser-Based Spectroscopic Technique in Material Science, National workshop on “Smart Materials: Theoretical and Experimental Approach” organized by Department of Physics, Sam Higginbottom Institute of Agriculture, Technology and Science, Allahabad, 7-8 August 2013.
34. Chaired a session and gave a talk on “Development of Laser-Induced Breakdown Spectroscopy for Multidimensional Applications” First National Conference on Trends & Applications in Laser Technology & Optoelectronics Organized by Amity Institute of Laser Technology and Optoelectronics & Amity School of Engineering & Technology at Amity University Haryana, Manesar, Gurgaon, Thursday, April 04, 2013.
35. Spectroscopic Techniques for the characterization of Materials. National Workshop on Recent Advances in Material Science, Organized by Department of Physics, University of Lucknow, 15-16 March 2013.
36. Laser-Induced Breakdown Spectroscopy – Basics & Applications, Seminar on Laser Science and Applications, Department of Physics, Karnataka University, Dharwad, 8-9 March 2013.
37. Challenges in LIBS spectra of liquid sample. Indo– US Workshop on Spectroscopy: Application to National Security (IUWSANS-2013), Department of Physics, Banaras Hindu University, Varanasi, January **18 – 20, 2013.**
38. Laser-Based Spectroscopic Technique with Special Reference to LIBS for Multidisciplinary Researches, Presidential Lecture in 100TH Indian Science Congress Associations, **3 – 7 January 2013.**
39. Detection of Pollutant in the Environmental Samples using LIBS, National Seminar on “Science for Shaping the Future of India” Organized by Allahabad Chapter Indian Science Congress Association, 9-10 November **9-10, 2012.**
40. New Spectroscopic Technique for Material Science: National Conference on Chemistry and Life organized by Department of Chemistry, CMP Degree College, University of Allahabad, September

16 and 17, 2012.

- 41.** Laser-Induced Breakdown Spectroscopy: Principle and Applications, Fourth SERC School on Laser Produced Plasmas: Physics and Applications Raja Romana Centre for Advanced Technology, **18th July 2012**
42. Chaired a session and gave a talk on “Synthesis of Nanocomposite for Diabetic Management, Workshop on Nanomaterials and Nanoantenna”, organized by Department of Physics, C. M. SCIENCE College, Mithila University, Darbhanga, 20-21 April 2012 (**As a Resource Person**)
43. Atmospheric contamination due to Cigarette and its smoke using LIBS, 2nd International Workshop on Spectroscopic Signatures of Molecular Complexes in our Atmosphere and Beyond” organized by U. P. College and BHU, 7-10, **Feb 2012**
- 44.** Synthesis of Colloid Gold Nanostructure for Medical Application, 1st International Conference on Physics of Materials and Materials Based Device Fabrication organized by Department of Physics, Shivaji University, Kolhapur, Maharashtra, 17-19 January 2012.
45. Advances in Spectroscopic Techniques Applied to Plant Materials, Refresher Course on “Plants and Environment” Organized by the Department of Botany, University of Allahabad, Allahabad during 3- 23 January 2012. (**As a Resource Person**).
46. Characterization of Granular Gallstone with LIBS, International Conference on Laser, Material Science and Communication organized by Department of Physics, The University of Burdwan, Burdwan, West Bengal, 7-9 Dec 2011.
47. Material Characterization using Laser-based Optical Technique, National Conference on Recent Trends in Material Science, Organized by K. S. Ramasamy College of Technology, Tiruchengode, Tamilnadu, 11-12 November 2011.
48. Application of LIBS in Material Science, Indian Science Congress Association, Allahabad Chapter, Chemistry Department, 6 November 2011.
49. Energetic Material with LIBS, **Adama University, Ethiopia**, 7th June 2011.
50. Calibration Free Laser-Induced Breakdown Spectroscopy, **Ambo University, Ethiopia**, 5th July 2011.
51. Trace Detection with Laser-Induced Breakdown Spectroscopy, Fuel Chemistry Division, BARC, Mumbai, **5th June 2011**.
52. Fundamentals of LIBS and Applications, National Seminar on Advances in Laser, Spectroscopy, and Nanomaterials, Organized by Nehru Gram Bharti University, Allahabad, **March 5-7, 2011**.
53. Herbal Plants in Traditional Medicine using Laser Spectroscopic technique, International Conference on Radiation, Environment and Health, Organized by Nehru Gram Bharti University, Allahabad, **Nov 19-21, 2010**.
54. Application of Laser-Induced Breakdown Spectroscopy in Plant Science, Refresher Course on “New Horizons in Botanical Sciences” Organized by the Department of Botany, University of Allahabad, Allahabad during **4th- 24th Nov. 2010**.
55. Potential of herbal plants in traditional medicine using Spectroscopic technique, National conference on Laser and Optical Science, organized by DHSK College, Dibrugarh, from **October 11 to 13, 2010**.

56. Biomaterial with Laser-Induced Breakdown Spectroscopy, International Conference on Recent Frontiers in Applied Spectroscopy, Organized by Department of Physics, Annamalai University, **22-24, Sep 2010.**
57. Variation of Heavy Metals in Water, Soil, and Plants Using LIBS, 6th International Conference on Laser-Induced Breakdown Spectroscopy organized by [Mississippi State University, USA](#), **13-17, Sep 2010.**
58. Spectroscopy in Material Science Department of Physics, [Adama University, Ethiopia](#), **17 June 2010.**
59. Laser-Induced breakdown spectroscopy and its Applications, Department of Physics, [Addis Ababa University, Ethiopia](#), **16 June 2010.**
60. Application of Spectroscopic Technique in Food Science, UGC Sponsored Refresher Course on “Emerging Trends in Food Technology and Nutritional Security – An Interdisciplinary Approach” organized by Center of Food Technology, University of Allahabad, **4- 24 Feb. 2010.**
61. Trace Detection in Atmosphere, “Its International Workshop on Spectroscopic Signatures of Molecular Complexes in our Atmosphere and Beyond” organized by U. P. College and BHU, **2-4 Feb 2010.**
62. Screening of Toxic Elements in Industrial wastewater using LIBS in “97th Indian Science Congress Association” Organized by Kerala University, Thiruvananthapuram, **3-7, Jan 2010**
63. Monitoring of energetic materials using LIBS, “7th International High Energy Materials Conference and Exhibit”, organized by High Energy Materials Laboratory, Pune India, **8-10 Dec 2009.**
64. Study and conservation of archeomaterial (coins) from Kaushambi using LIBS, Seminar on “Indian Archaeology: Recent Advances and New Trends” organized by Department of Ancient History, Culture, and Archaeology, AU, Allahabad, **14 -17 November 2009.**
65. Laser Spectroscopy as a tool for monitoring of traces in different media, “Science Symposium” organized by Lala Laxmi Narain Degree College, Sirsa, Allahabad **12th November 2009**
66. The Role of Laser Spectroscopic Techniques in Environmental and Hazard Monitoring Department of Physics, Lecture Seminar organized by School of Basic Science, Allahabad Agricultural Institute Deemed University, Allahabad, **4th November 2009.**
67. LIBS: A versatile tool for material characterization, National Symposium on Laser and its Applications, CCS University, Meerut, September **12, 2009.**
68. Laser-Induced Breakdown Spectroscopy in Biological Science, National Symposium on Advances in Laser and Spectroscopy, Sagar University, **Feb. 27-28, 2009.**
69. Real-Time trace element analysis of ice-core by laser-induced breakdown spectroscopy, National Snow Science Workshop, organized by Snow & Avalanche Study Establishment, Chandigarh during **11-12 January (2008)**
70. Application of Laser Spectroscopic Technique in the Environmental and Biological Science. In the 49th Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers **June 18- July 15, 2008.**
71. Application of Laser Spectroscopic Techniques in Agriculture Science, Department of Physics, Agriculture Deemed University, Allahabad, **May 2008.**

72. Application of Laser Spectroscopic Technique in different branches of science. In the 48th Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers Scheduled from **March 4-31, 2008.**
73. Application of Laser-Induced Breakdown Spectroscopic Technique in different branches of science. In the 47th Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers. **Dec. 6, 2007-Jan2, 2008.**
74. LIBS; A versatile tool for material characterization, National Conference on Scientific Application of mathematics Organized by V.S. Mehta P.G. College of Science Bharwari, **December 23-24, 2007.**
75. Quantitative Analysis of Gallstones Using Calibration Free LIBS, First North American Symposium on Laser-Induced Breakdown Spectroscopy, Organized by [Mississippi State University, USA](#), **8-10 October 2007.**
76. Trace elemental analysis by using Laser-Induced Breakdown Spectroscopy, in the 12th ISMAS Symposium cum Workshop on Mass Spectrometry held in Dona Paula Goa **March 25 – 30, 2007.**
77. Recent trends in Laser-induced breakdown spectroscopy, 9th Conference of International Academy of Physical Sciences, Held at Dr. B. R. Ambedkar University, Agra, **Feb 3-5, 2007.**
78. Photoacoustic Spectroscopy in Medical Sciences, Fifteenth National Symposium on Ultrasonic, Held at Physics Department, Allahabad University, Allahabad, India, **November, 1-3, 2006.**
79. Low Temperature Photoacoustic Spectrometer for the study of Ice and Snow, First INDO-US Workshop on Spectroscopy; Future Trends in Spectroscopy: Application to National Security, Organized by Banaras Hindu University, India and Mississippi State University, USA **January 9-11, 2006.**
80. Photoacoustic Spectroscopy in Material Sciences, National Symposium on Recent Trends in Fluorescence Spectroscopy and its Applications, Held at Physics Department, Kumaun University, Nainital, India, **December 1-3, 2005.**
81. Photoacoustic Spectroscopy in Biosciences, National Symposium on Advances in Material Science Held at Physics Department, D. D. U. Gorakhpur University, Gorakhpur, India, **March 17-19, 2005.**
82. Laser-Induced Breakdown Spectroscopy of Al Alloy. Proc. of the National Symposium on Atomic, Molecular Structure, Interactions and Laser Spectroscopy Held at Physics Department, B.H.U., India, **March 14-15, 2004.**
83. Photoacoustic Spectroscopic Study of Mineral Deficiency in Plants. Proc. of the National Symposium on Improving Crop Productivity in An Ecofriendly Environment Held at G.B. Pant University of Agri. And Technology **Oct. 15-17, 2003.**
84. Use of Photoacoustic Spectroscopy in Disease Diagnosis of Plants. Proc. of the National Seminar on Recent Trends in Vibrational Spectroscopy Held at Nehru Memorial College, Puthanampatti, Tiruchirappalli, **July 23-24, 1999.**
85. Effect of Magnetic Field on Laser Optogalvanic Spectrum of Iodine Molecule. Proc. of the Conference on Recent Trends in Vibrational Spectroscopy Held at Meerut University, Meerut, India **1996.**
86. Study of Essential Oils from Medicinal and Aromatic Plants Using Spectroscopic Techniques. Proc. of the College of Methods and Experimental Techniques in Biophysics, Held at I.C.T.P., Trieste,

Italy **1993**.

87. Laser Optogalvanic Spectroscopy of Diatomic Molecules. Proceeding of The Winter College on Atomic and Molecular Physics at I.C.T.P. Trieste, Italy (**1987**).

Annexure 2

List of Research Publications of Dr. A. K. Rai

A. PATENT

H. Zhang, A. K. Rai, J.P. Singh, and F. Yu Yueh, Fiber Optic Laser-Induced Breakdown Spectroscopy Probe For Molten Material Analysis, Patent No. 6762835 (2004).

B. Editor of the Book

1. **Emerging Trend in Laser and Spectroscopy and Applications, Allied Publisher PVT. LTD. ISBN: 978-81-8424**

C. Research Publications

FOREIGN JOURNALS

1. Darpan Dubey and Awadhesh Kumar Rai, Morbidity and Forensic examination of the vermilion samples using LIBS, FTIR and ICP-OES Spectroscopic techniques J of Applied Spectroscopy, 2024 (Revised)
2. Vikas Gupta , Abhishekh Kumar Rai , Tejmani Kumar , Akash Kumar Tarai , Manoj Kumar Gundawar and A. K. Rai, Calibration-free approaches for quantitative analysis of a brass sample journal Zeitschrift für Naturforschung A, -A Journal of Physical Science, 2024, <https://doi.org/10.1515/zna-2023-0280>
3. V. K. Shukla, Abhishek Kr. Rai, S. Dubey, R. Kumar, P. K. Shahi, N. Rai, and A. K. Rai, Rare earth elements in black sands from Konkan and Malabar coasts of India, J of Nuclear Science and Technology 2024 <https://doi.org/10.1080/00223131.2023.2234366>
4. Darpan Dubey and **Awadhesh Kumar Rai**, Assessment of toxicity of residues of normal/green cracker and their impact on soil, Journal of Laser Applications 36, 000000 (2024); doi: 10.2351/7.0001266
5. Vikas Gupta, Abhishek Kumar Rai, Tejmani Kumar, Akash Tarai, G. Manoj Kumar Gundawar, **A. K. Rai**, Compositional analysis of copper and iron-based alloys using LIBS coupled with chemometric method, Analytical Sciences, Accepted, 14 Sep 2023, DOI: 10.1007/s44211-023-00429-y
6. Zainab Gazali, Vikas Gupta, Tejmani Kumar, Rohit Kumar, Akash Kumar Tarai, Pradeep K Rai, Manoj Kumar Gundawar and **Awadhesh K Rai**, Effect of mineral elements on the formation of gallbladder stones using spectroscopic techniques, Analytical and Bioanalytical Chemistry, 16, August 2023, <https://doi.org/10.1007/s00216-023-04904-3>
7. Pratima Mishra, Pradeep Kumar Rai, Rohit Kumar, **Awadhesh Kumar Rai**, Monitoring of minerals level in dialysate during Hemodialysis treatment of kidney patients using LIBS Technique, Lasers in Medical Science, 22 Julay, 2023, 38:165 <https://doi.org/10.1007/s10103-023-03826-x>
8. V. K. Shukla, Abhishek Kr. Rai, Rajneesh Kumar Verma and **A. K. Rai**, Investigation of K, Th, U in multiple hoarded granites and their effects in the environment using LIBS coupled with chemometric technique, Insights Min Sci technol, 2023, 4, issue 2, <https://doi.org/10.1007/s12596-023-01265-z>
9. Vikas Gupta, Abhishek Kumar Rai, Tejmani Kumar, Rajendhar Junjuri, G. Manoj Kumar, **A. K. Rai**, Chemical and Physical Studies of metallic alloy-based Indian Coins with LIBS coupled with Multivariate analysis, Plasma Science and Technology, 16 October, 2023, <https://doi.org/10.1007/s44211-023-00429-y>
10. Priyanka Yadav, Vartika Mishra, Tejmani Kumar, **Awadhesh K Rai**, Ayush Gaur, Mohan P. Singh, An approach to evaluate Pb tolerance and its removal mechanisms by Pleurotus opuntiae, Journal of Fungi, March 2023 Accepted

11. Pratima Mishra, Rohit Kumar, **Awadhesh Kumar Rai**, Development and Optimization of Experimental Parameters for the Detection of Trace of Heavy metal (Cr) in the Liquid Samples using LIBS Technique, *J. Laser Appl.* **35**, 022021 (2023); <https://doi.org/10.2351/7.0000959>
12. Reshu Kumari, Abhishek Dwivedi, Rohit Kumar, **Awadhesh Kumar Rai**, Evaluation of the nutrients in milk supplements suitable for children using LIBS and PAS technique, *Results in Optics*, February 2023, **11**, 100395
13. Kavita Singh · Shivesh Kumar Azad, Hemen Dave, · Bablu Prasad, Deepak M. Maurya, · Madhu Kumari, Darpan Dubey, **A. K. Rai**, Deepak Singh, Mika Sillanpää, · Maulin P. Sah, Kumar Suranjit Prasad, A mechanistic insight into chromium (VI) ion adsorption onto pristine, UCB as well as Al-modified Neolamarckia cadamba wood biochar, *Biomass Conversion and Biorefinery*, 8 December 2022, <https://doi.org/10.1007/s13399-022-03620-9>
14. Darpan Dubey, Rohit Kumar, Abhishek Dwivedi, and **A. K. Rai**, Study of electronic bands of diatomic molecules for the evaluation of toxicity of Green Crackers using LIBS coupled with a chemometric method, *Electron. Mater.* 2023, **4**, 1–14, <https://doi.org/10.3390/electronmat4010001>
15. Sonali Dubey, Abhishek Rai, Jayanta K. Pati, Rohit Kumar, Mrigank Mauli Dwivedi, **Awadhesh Kumar Rai**, Domainal investigation of a quartz-fluorite composite using spectroscopic techniques, *Atoms*, October 2022, **10**, 133. <https://doi.org/10.3390/atoms10040133>
16. Tejmani Kumar, Prashant Kumar Rai, Abhishek Kumar Rai, Nilesh Kumar Rai, **A K Rai**, Geeta Watal, Identification of Elements in T. dioica Leaves responsible for Diabetes Management using Laser- Induced Breakdown Spectroscopy (LIBS), *Foundations*, **2022**, **2**, 981–998. <https://doi.org/10.3390/foundations2040066>
17. Tejmani Kumar, Abhishek Kr Rai, Abhishek Dwivedi, Rohit Kumar, Mohammad Azam, Vinti Singh, Neelam Yadav, and **Awadhesh Kr. Rai**, Chemical characterization for the detection of impurities in tainted and natural Curcuma longa from India using LIBS coupled with PCA different analytical techniques, *Atoms*, September 2022, **10**, 91. <https://doi.org/10.3390/atoms10030091>
18. Shikha Awasthi, Rohit Kumar, Ratnesh K Pandey, and **A.K. Rai**, New insights on modern age coins by CF-LIBS method and chemometric approaches, *Journal of Applied Spectroscopy*, September 2022, **89**, No. 4, 780788, DOI 10.1007/s10812-022-01425-2
19. Pratima Mishra, Rohit Kumar, Akash Kumar Tarai, Manoj Kumar, **Awadhesh Kumar Rai**, Characterization of Toxic Substances present in Smoking Tobacco using different Spectroscopic Techniques, *Journal of Laser Applications* 05.06.2022, Vol.34, Issue 2, <https://doi.org/10.2351/7.0000638>
20. Pratima Mishra, Rohit Kumar, Abhishek Dwivedi, **Awadhesh Kumar Rai**, Analysis of constituents present in smokeless tobacco (Nicotiana tabacum) using Spectroscopic Techniques, *Methods and Applications in Fluorescence*, 2022, DOI: <https://doi.org/10.1088/2050-6120/ac5e11>
21. Abhishek Roy, Abhishek Dwivedi, Santosh Kumar, Hirdyesh Mishra, **A., K., Rai** and S.B.Rai, Study of near-infrared induced color tunability and optical bistability in Ho³⁺/Yb³⁺ codoped YV_{0.75}Ta_{0.25}O₄ phosphor, *Optical Materials*, December 2021, Volume 122, 111701
22. Sonali Dubey, Rohit Kumar, Abhishek K. Rai, Jayanta K. Pati, Johannes Kiefer, **Awadhesh K. Rai**, Rapid analysis of chemical composition and physical properties of gemstones using LIBS and chemometric technique, *Appl. Sci.* 02 July **2021**, **11** (13), 6156; <https://doi.org/10.3390/app11136156>

23. Sonali Dubey, Rohit Kumar, Abhishek K. Rai, **Awadhesh K. Rai**, Laser Induced breakdown spectroscopy (LIBS): Application to geological materials, Optics and Spectroscopy, October 2021, **129** (10), page----.
24. Zainab Gazali, Rohit Kumar, Pradeep K. Rai, Pramod K. Rai, **Awadhesh K. Rai**, and Surya N. Thakur, Discrimination of Gallbladder Stone Employing Laser-Induced Breakdown Spectroscopy (LIBS) and Photoacoustic Spectroscopy (PAS), SpectroChemica Acta Part A: Molecular and Biomolecular Spectroscopy, 12 May 2021, **260**, 119948.
25. Reshu Kumari & Rohit Kumar & Apeksha Rai & **Awadhesh Kumar Rai**, Evaluation of Na and K in anti-diabetic ayurvedic medicine using LIBS, Lasers in Medical Science, 23 March **2021**, <https://doi.org/10.1007/s10103-021-03289-y>
26. R. Kumar, G. S. Maurya, A. Devanathan, **A. K. Rai**, Evaluation of the calibration-free and multivariate method for quantitative analysis in laser-induced breakdown spectroscopy, Journal of Applied Spectroscopy, 3 July **2021**, **88** (3), 580-588.
27. Kartikey Dharmendra, Abhishek Roy, Abhishek Dwivedi, **Awadhesh Kumar Rai**, Shyam Bahadur Rai, and Devendra Kumar, Two steps enhancement of dual-mode (UC and DS) behaviour of Ho³⁺/Yb³⁺ and Tm³⁺/Yb³⁺ co-doped GdVO₄ phosphors: improvement in spectral and color purity, Materials Research Bulletin, July. **2021**, **139**, <https://doi.org/10.1016/j.materresbull.2021.111280>.
28. Abhishek Roy, Abhishek Dwivedi, Hridhyas Mishra, **Awadhesh K Rai** and Shyam B. Rai, Generation of color-tunable emission from Ho³⁺/Tm³⁺/Yb³⁺ co-doped YTaO₄ phosphors through NIR excitation under different conditions (variation of concentration, excitation pump power and the external temperature), Journal of Alloys and Compounds, 5 June **2021**, **865**, page 158938.
29. Abhishek Dwivedi, Devendra Kumar, S. B. Rai, and **A. K. Rai**, Effect of the host on the Radiative (upconversion emission) as well as Nonradiative relaxation (laser-induced optical heating) in Tm³⁺/Yb³⁺ co-doped Phosphors, Journal of Luminescence, October 2020, **226**, DOI: <https://doi.org/10.1016/j.jlumin.2020.117421>
30. A. K. Rai, J. K. Pati, C. G. Parigger, S. Dubey, **A. K. Rai**, B. Bhagabaty, A. C. Mazumdar, and K. Duorah, "Plasma Spectroscopic Study of Dergaon Meteorite, India," Molecule, February 2020, **25** (4), 984.
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32. A. K. Rai, J. K. Pati, C. G. Parigger, and **A. K. Rai**, Plasma Spectroscopy of Various Types of Gypsum: An Ideal Terrestrial Analogue, Atoms, 21 July 2019, **7** (3), 72, 1
33. P. K. Tiwari, N. K. Rai, R. Kumar, C. G. Parigger and **A. K. Rai**, Atomic and Molecular Laser-Induced Breakdown Spectroscopy of Selected Pharmaceuticals, Atoms, July 2019, **7** (3), 71-81, 1-12, 1.
34. Pravin Kumar Tiwari, Shweta Gaur, Abhimanyu K Singh, Vijay P Singh, Devendra Kumar Chauhan, Durgesh Kumar Tripathi, Naleeni Ramawat, Awadhesh K Rai, Sheo M Prasad, "Liquid assisted pulsed laser ablation synthesized copper oxide nanoparticles (CuO-NPs) and their differential impact on rice seedlings," Ecotoxicology and Environmental Safety, Jul. 2019, **176**, 321–329, 3

35. Prachee Dubey, Ayushi Tiwari, Pravin Kumar Tiwari, Shikha Awasthi, Awadhesh Kumar Rai, Geeta Watal. Phytochemical and Phytoelemental Profile of *J. officinale*. International Journal of Pharmacognosy and Phytochemical Research, 25 January 2019, **11** (1), 5-9. ISSN: 0975-4873
36. R. Kumar, A. Devanathan, N. L. Mishra, and **A. K. Rai**, "Quantification of Heavy Metal Contamination in Soil and Plants Near a Leather Tanning Industrial Area Using Libs and TXRF," Journal of Applied Spectroscopy, 8 November 2019, **86** (5), 942–947.
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38. A. Tiwari, P. Dubey, P. K. Tiwari, G. Watal and **A. K. Rai**, "Impact of Phytochemicals and Phytoelements on Therapeutic Attributes of *A. Esculentus* Leaves: A LIBS Based Study," Journal of Biological and Chemical Research, June 2018, **35** (2), 427-433, 2
39. V. Singh, S. Kumar, **A. K. Rai**, "Sensory analysis of bar samples prepared from mahua (*Madhuca longifolia*) flower syrup using fuzzy logic," Nutrafoods, July 2018, **17**, 137-144.
40. A. Pathak, N. Rai, R. Kumar, P. Rai, **A. K. Rai**, and C. Parigger, "Gallstone Magnesium Distributions from Optical Emission Spectroscopy," Atoms, Aug. 2018, **6** (3), 42.
41. V. Singh. S. Kumar, J. Singh, and **A. K. Rai**, "Fuzzy logic sensory evaluation of cupcakes developed from the mahua flower (*Madhuca longifolia*)," Journal of Emerging Technologies and Innovative Research, Jan 2018, **5** (1), 411-421.
42. P. K. Tiwari, S. Awasthi, R. Kumar, R. K. Anand, P. K. Rai, and **A. K. Rai**, "Rapid analysis of pharmaceutical drugs using LIBS coupled with multivariate analysis, Lasers in Medical Science, Oct. 2017, **33** (2), 263–270, 4.
43. J. Sinha, V. Singh, J. Singh, and **A. K. Rai**, "Phytochemistry, Ethnomedical Uses and Future Prospects of Mahua (*Madhuca longifolia*) as a Food: A Review," J Nutr Food Scie., 2017, **07** (1) 573.
44. A. Nath, P. K. Tiwari, **A. K. Rai**, and S. Sundaram, "Microalgal consortia differentially modulate progressive adsorption of hexavalent chromium," Physiology and Molecular Biology of Plants, Feb. 2017, **23** (2), 269–280, 3.
45. S. Awasthi, R. Kumar, A. Devanathan, R. Acharya, and **A. K. Rai**, "Multivariate methods for the analysis of environmental reference materials using laser-induced breakdown spectroscopy," Anal. Chem. Res, 16 January 2017, **12**, 10–16.
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49. J. Singh, V. Singh, S Shukla, and **A. K. Rai**, Phenolic Content and Antioxidant Capacity of Selected Cucurbit Fruits Extracted with Different Solvent, J Nutr. Food Sci., 14 November 2016, **6** (6), 1-8.

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25. The vision of CUG is to establish itself as a centre of excellence with social commitment by integrating modern, scientific and technological knowledge and skills with the basic human ethos and values

1	National	11/01/2008	National Snow Science Workshop, organized by Snow Avalanche Study	Invited Talk on Real-Time trace element analysis of ice-core by laser-induced breakdown spectroscopy
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			Establishment, Chandigarh	
2	International	05/03/2020	PITTCO, Chicago, USA	Invited Talk on Laser Induced Breakdown Spectroscopy Application to Biomedical Sciences
3	National	19/02/2019	National Symposium on Applied Spectroscopy Biology and Medical Science organized by Udai Pratap College Varanasi	Invited Talk on the Application of Laser- based technique for the study of Biomaterials
4	National	29/03/2017	National Seminar on Materials Science, X and Gamma ray spectroscopies organized by Department of Physics, Dr. Babasaheb Ambedkar Marathwada University	Invited Talk on Spectroscopy a tool to probe the matter
5	National	15/02/2017	National Conference on Recent Advances in Material Science and Spectroscopy Organized by Physics Department, Mata Vaishno Devi University, Katra, Jammu Kashmir	Invited Talk on the Study of impurities present inside the Tokamak chamber using LIBS
6	International	27/01/2017	International Conference on Structure and Dynamics of Biomolecule organized by Department of physics, DDU university, Gorakhpur	Invited Talk on the study of samples of Biological importance using Laser- induced breakdown spectroscopy
7	National	22/12/2016	25TH DAE-BRNS National laser Symposium organized	Invited Talk on Experimental setup for online study of impurities

			at the Department of Physics, School of Applied Sciences, KIIT University Bhubaneswar	on plasma-facing components of Aditya tokamak using LIBS
8	International	23/06/2016	International Symposium on Molecular Spectroscopy, Champaign-Urbana, Illinois, USA,	Invited Talk on Study of laser-produced plasma of limiter of the Aditya tokamak for detection of molecular bands
9	International	27/05/2016	The Center for laser applications, University of Tennessee Space Institute, University of Tennessee, USA	Invited Talk on the Study of deposited materials on the optical components of a toroidal chamber with magnetic coils tokamak using laser-induced breakdown spectroscopy,
10	National	18/02/2016	HP-HT, and use electron microscopy, organized by, National Center of Experimental Mineralogy and Petrology, University of Allahabad, 2016	Invited Talk on Laser-Based Technique for in-situ, online Characterization of Materials
11	National	29/03/2016	UGC Sponsored Refresher Course on Food Safety and public health organized by the Center of Food Technology, University of Allahabad	Invited Talk on Suitable Spectroscopic Technique for monitoring of toxic metals in Food
12	International	03/03/2014	PITTCON, Conference on Recent Advances in Laser-Induced Breakdown Spectroscopy held in Chicago, Illinois, USA	Invited Talk on Laser-Induced Breakdown Spectroscopy in Life Science
13	National	22/03/2014	Winter School on Advances in Laser Spectroscopy and	Invited Talk on Principles and Advantages of LIBS

			Applications organized by the Department of Physics, BHU, Varanasi	
14	National	23/03/2014	Winter School on Advances in Laser Spectroscopy and Applications organized by the Department of Physics, BHU, Varanasi	Invited Talk on Identification and quantification of impurities deposited on the different parts of the Tokamak using LIBS
15	National	31/03/2014	National Conference on Vistas of Environmental Awareness, organized by K.N. Government P G College, Gyanpur	Chaired a session and gave an invited lecture on Vigilant watch on environmental pollution due to toxic metals using LIBS
16	National	03/10/2013	National Seminar on Spectroscopic Techniques and its applications for material characterization, organized by Department of Optoelectronics, University of Kerala, Thiruvananthapuram-695581	Chaired a session and gave a talk on the Monitoring of Minerals in processed food materials using LIBS
17	National	07/08/2013	National workshop on Smart Materials Theoretical and Experimental Approach organized by Department of Physics, Sam Higginbottom Institute of Agriculture, Technology, and Science, Allahabad	Invited Talk on the Application of Laser Based Spectroscopic Technique in Material Science
18	National	04/04/2013	National Conference on Trends Applications in Laser Technology Optoelectronics	Chaired a session and gave a talk on the Development of Laser-Induced Breakdown Spectroscopy for

			Organised by Amity Institute of Laser Technology and Optoelectronics Amity School of Engineering Technology at Amity University	Multidimensional Applications
19	National	15/03/2013	National Workshop on Recent Advances in Material Science, Organized by the Department of Physics, University of Lucknow	Invited Talk on Spectroscopic Techniques for characterization of Materials.
20	National	08/03/2013	Seminar on Laser Science and Applications, Department of Physics, Karnatak University, Dharwad	Invited Talk on Laser Induced Breakdown Spectroscopy Basics Applications
21	National	18/01/2013	Indo US Workshop on Spectroscopy Application to National Security IUWSANS-2013, Department Of Physics, Banaras Hindu University, Varanasi	Invited Talk on Challenges in LIBS spectra of liquid sample
22	National	03/01/2013	Presidential Lecture in Physical Science Section, 100TH Indian Science Congress Associations	Invited Talk on Presidential Lecture on Laser Based Spectroscopic Technique with Special Reference to LIBS for Multidisciplinary Researches
23	National	03/01/2015	ISCA, Mumbai	Platinum Jubilee Lecture in Physical Science Section of 102nd Indian Science Congress held at Mumbai University
24	International	08/01/2015	International Workshop Conference on Frontiers of	Invited Talk on Laser Induced Breakdown Spectroscopy

			Spectroscopy at Banaras Hindu University	Conference on Frontiers of Spectroscopy at Banaras Hindu University
25	National	01/08/2014	Prof. Nand Lal Singh Memorial Lecture, Organized Annually by Vigyan Parishad, Allahabad	Invited Talk on Environment pollution and its monitoring using a spectroscopic technique
26	National	09/11/2012	National Seminar on Science for Shaping the Future of India Organized by Allahabad Chapter Indian Science Congress Association	Invited Talk on the Detection of Pollutants in the Environmental Samples using LIBS
27	National	16/09/2012	National Conference on Chemistry and Life organized by the Department of Chemistry, CMP Degree College, University of Allahabad	Invited Talk on New Spectroscopic Technique for Material Science
28	National	18/07/2012	Fourth SERC School on Laser Produced Plasmas Physics and Applications Raja Ramanna Centre for Advanced Technology, Indore	Invited Talk on Laser Induced Breakdown Spectroscopy Principle and Applications
29	National	20/04/2012	Workshop on Nanomaterials and nanoantenna, organized by Department of Physics, C. M. SCIENCE College, Mithila University, Darbhanga	Chaired a session and gave a talk on the Synthesis of Nanocomposite for Diabetic Management
30	International	07/02/2012	2nd International Workshop on Spectroscopic Signatures of	Invited Talk on Atmospheric contamination due to

			Molecular Complexes in our Atmosphere and Beyond organized by U. P. College and BHU	Cigarette and their smoke using LIBS
31	International	18/01/2012	Ist International Conference on Physics of Materials and Materials Base3d Device Fabrication organized by the Department of Physics, Shivaji University, Kolhapur, Maharastra	Invited Talk on Synthesis of Colloid Gold Nanostructure for Medical Application
32	National	03/01/2012	Refresher Course on Plants and Environment Organized by the Department of Botany, University of Allahabad, Allahabad	Invited Talk on Advances in Spectroscopic Techniques Applied to Pant Materials
33	International	07/12/2011	International Conference on Laser, Material Science, and Communication organized by the Department of Physics, The University of Burdwan, Burdwan, West Bengal	Invited Talk on Characterization of Granular Gallstone with LIBS
34	National	11/11/2011	National Conference on Recent Trends in Material Science, Organized by K. S. Rangasamy Colege of Technology, Tiruchengode, Tamilnadu	Invited Talk on Material Characterization using Laser based Optical Technique
35	National	06/11/2011	Indian Science Congress Association, Allahabad Chapter, Chemistry Department,	Invited Talk on the Application of LIBS in Material Science

			University of Allahabad	
36	International	07/07/2011	Adama University, Ethiopia	Invited Talk on Energetic Material with LIBS
37	International	05/07/2011	Ambo University, Ethiopia	Invited Talk on Calibration Free Laser Induced Breakdown Spectroscopy
38	National	05/06/2011	Fuel Chemistry Division, BARC, Mumbai	Invited Talk on Trace Detection with Laser Induced Breakdown Spectroscopy
39	National	05/03/2011	National Seminar on Advances in Laser, Spectroscopy, and Nanomaterials, Organized by Nehru Gram Bharti University, Allahabad	Invited Talk on Fundamentals of LIBS and Applications
40	International	19/11/2010	International Conference on Radiation, Environment and Health, Organized by Nehru Gram Bharti University, Allahabad	Invited Talk on Herbal Plants in Traditional Medicine using Laser Spectroscopic technique
41	National	04/11/2010	Refresher Course on New Horizons in Botanical Sciences Organized by the Department of Botany, University of Allahabad, Allahabad	Invited Talk on the Application of Laser-Induced Breakdown Spectroscopy in Plant Science
42	National	11/10/2010	National conference on Laser and Optical Science, organized by DHSK College, Dibrugarh	Invited Talk on the Potential of herbal plants in traditional medicine using Spectroscopic technique

43	International	22/09/2010	International Conference on Recent Frontiers in Applied Spectroscopy, Organized by the Department of Physics, Annamalai University	Invited Talk on Biomaterial with Laser Induced Breakdown Spectroscopy
44	International	13/09/2010	6th International Conference on Laser Induced Breakdown Spectroscopy organized by Mississippi State University, USA	Invited Talk on the Variation of Heavy metals in water, Soil, and Plants Using LIBS
45	International	17/06/2010	Department of Physics, Adama University, Ethiopia	Invited Talk on Spectroscopy in Material Science
46	International	16/06/2010	Department of Physics, Addis Ababa University, Ethiopia	Invited Talk on Laser-Induced breakdown spectroscopy and its Applications
47	National	04/02/2010	UGC Sponsored Refresher Course on Emerging Trends in Food Technology and Nutritional Security An Interdisciplinary Approach organized by Center of Food Technology, University of Allahabad	Invited Talk on the Application of Spectroscopic Technique in Food Science
48	International	02/02/2010	1st International Workshop on Spectroscopic Signatures of Molecular Complexes in our Atmosphere and Beyond organized by U. P. College and BHU	Invited Talk on Trace Detection in the Atmosphere
49	National	05/01/2010	97th Indian Science Congress Association	Invited Talk on Screening of Toxic Elements in

			Organized By Kerala University, Thiruvananthapuram	Industrial wastewater using LIBS
50	International	08/12/2009	7th International High Energy Materials Conference and Exhibit, organized by High Energy Materials Laboratory, Pune India	Invited Talk on Monitoring of energetic materials using LIBS
51	National	14/11/2009	Seminar on Indian Archaeology Recent Advances and New Trends organized by Department of Ancient History, Culture and Archaeology, University of Allahabad,	Invited Talk on the Study and conservation of archaeomaterial coins from Kaushambi using LIBS
52	National	12/11/2009	Science Symposium organized by Lala Laxmi Narain Degree College, Sirsa, Allahabad	Invited Talk on Laser Spectroscopy as a tool for monitoring traces in different media
53	National	04/11/2009	Lecture Seminar organized by Department of Physics, School of Basic Science, Allahabad Agricultural Institute Deemed University, Allahabad	Invited Talk on The Role of Laser Spectroscopic Techniques in Environmental and Hazard Monitoring
54	National	12/09/2009	National Symposium on Laser and its Applications, CCS University, Meerut	Invited Talk on LIBS A versatile tool for material characterization
55	National	27/02/2009	National Symposium on Advances in Laser and Spectroscopy, Sagar University	Invited Talk on Laser Induced Breakdown Spectroscopy in Biological Science
56	National	18/06/2008	49th Orientation Course Organized by	Invited Talk on the Application of Laser

			the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers	Spectroscopic Technique in the Environmental and Biological Science
57	National	01/05/2008	Agriculture Science, Department of Physics, Agriculture Deemed University, Allahabad	Invited Talk on Application of Laser Spectroscopic Techniques in Agriculture Science
58	National	04/03/2008	48th Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers	Invited Talk on the Application of Laser Spectroscopic Technique in different branches of science
59	National	06/12/2008	47th Orientation Course Organized by the UGC-Academic Staff College, BHU Varanasi for the College and University Teachers	Invited Talk on the Application of Laser Induced Breakdown Spectroscopic Technique in different branches of science
60	National	23/12/2007	National Conference on Scientific Application of mathematics Organized by V.S. Mehta P.G. College of Science Bharwari	Invited Talk on LIBS A versatile tool for material characterization
61	International	08/10/2007	First North American Symposium on Laser Induced Breakdown Spectroscopy, Organized by Mississippi State University, USA	Invited Talk on Quantitative Analysis of Gallstones Using Calibration Free LIBS
62	International	25/03/2007	12th ISMAS Symposium cum Workshop on Mass	Invited Talk on Trace elemental analysis by using Laser Induced Breakdown Spectroscopy

			Spectrometry held in Dona Paula, Goa	
63	National	03/02/2007	9th Conference of International Academy of Physical Sciences, Held at Dr. B. R. Ambedker University, Agra	Invited Talk on Recent trends in Laser-induced breakdown spectroscopy
64	National	01/11/2006	Fifteenth National Symposium on Ultrasonic, Held At Physics Department, Allahabad University, Allahabad	Invited Talk on Photoacoustic Spectroscopy in Medical Sciences
65	International	09/01/2006	First INDO-US Workshop on Spectroscopy Future Trends in Spectroscopy Application to National Security, Organized by Banaras Hindu University, India and Mississippi State University, USA	Invited Talk on Low-Temperature Photoacoustic Spectrometer for the study of Ice and Snow
66	National	01/12/2005	National Symposium on Recent Trends in Fluorescence Spectroscopy and its Applications, Held At Physics Department, Kumaun University, Nainital	Invited Talk on Photoacoustic Spectroscopy in Material Sciences
67	National	17/03/2005	National Symposium on Advances in Material Science Held At Physics Department, D. D. U. Gorakhpur University, Gorakhpur	Invited Talk on Photoacoustic Spectroscopy in Biosciences

68	National	15/03/2004	National Symposium On Atomic, Molecular Structure, Interactions And Laser Spectroscopy Held At Physics Department, B.H.U.	Invited Talk on Laser Induced Breakdown Spectroscopy of Al Alloy
69	National	15/10/2003	National Symposium On Improving Crop Productivity In An Ecofriendly Environment Held At G.B. Pant University Of Agri. And Technology	Invited Talk on Photoacoustic Spectroscopic Study of Mineral Deficiency
70	International	23/07/1999	National Seminar On Recent Trends In Vibrational Spectroscopy Held At Nehru Memorial College, Puthanampatti, Tiruchirapalli	Invited Talk on the Use of Photoacoustic Spectroscopy in Disease Diagnosis Of Plants
71	National	01/01/1996	Conference on Recent Trends in Vibrational Spectroscopy Held At Meerut University, Meerut	Invited Talk on the Effect of Magnetic Field on Laser Optogalvanic Spectrum Of Iodine Molecule
72	International	05/10/1992	College on Methods and Experimental Techniques In Biophysics, Held At I.C.T.P., Trieste, Italy	Study of Essential Oils from Medicinal and Aromatic Plants Using Spectroscopic Techniques
73	International	06/02/2002	Laser Applications To Chemical And Environmental Analysis Held At Boulder, Colorado, USA	Laser-induced breakdown spectroscopy of liquid and solid samples in the presence of a Magnetic Field
74	National	14/12/1998	National Laser Symposium Held At I.I.T. Kanpur	Photoacoustic Spectroscopy of Wheat

				Genotype EKBSN-1 and FBPFM
75	National	02/02/1993	Saha Centenary International Symposium Of Spectroscopy And Astrophysics, Allahabad	Spectral Analysis of Mentha Oils
76	National	02/03/1991	National Symposium On Molecular Spectroscopy Held At Physics Department, B.H.U. Varanasi	Photoacoustic Spectroscopy of Menthol Molecule
77	National	07/12/1989	Second IPA/DST Symposium on Lasers and Applications at Banaras Hindu University, Varanasi	Two-Photon Optogalvanic Detection of the C-X System of Hgbr
78	National	04/01/1987	74th Session of Indian Science Congress at Bangalore Univ. Bangalore	Laser Optogalvanic Spectroscopy Of Molecules
79	International	03/10/1987	International Laser Science Conference III at Atlanta City, New Jersey, U.S.A.	Optogalvanic Signal in the B-X System of Hgbr
80	National	10/10/1986	4th Quantum Electronic Symposium At Cochin University, Cochin	Optogalvanic Spectrum of Iodine Molecule