

**A
B
S
T
R
A
C
T
S**

National Conference on Laser and Optical Science



Organized by
DEPARTMENT OF PHYSICS
D.H.S.K. College, Dibrugarh



In collaboration with
The Society for Laser and Optical Science

ASHWINI CHARAN CHANDRA CENTRAL LIBRARY
Accession No. 72
Call No.
Date

NATIONAL CONFERENCE ON LASER AND OPTICAL SCIENCE



Organized by
DEPARTMENT OF PHYSICS
D.H.S.K. College, Dibrugarh



In collaboration with
THE SOCIETY FOR LASER AND OPTICAL SCIENCE

NATIONAL CONFERENCE ON LASER AND OPTICAL SCIENCE

The Organising Committee takes pleasure to place on record its thanks & gratitudes to the following National Organisations for the financial support extended to the conference.

- ▶ **University Grants Commission**
- ▶ **Department of Science & Technology**
- ▶ **Council of Scientific and Industrial Research**
- ▶ **Oil India Limited**
- ▶ **Oil & Natural Gas Commission**

Special Thanks to

- 1) *Dr. R. Tamuli, Principal, Sonari College*
- 2) *Dr. D. Neog, Dhemaji College*
- 3) *Dr. S. Bhattacharyya, DCB College*
- 4) *Dr. R. Borah, Chayduar College*
- 5) *Mr. Tapan Kr. Gogoi, General Secretary, AASU*
- 6) *Mr. Rituparna Baruah, Dibrugarh*
- 7) *Mr. Hiteshwar Phukan, Duliajan*

EDITORIAL BOARD : _____

Dr. Ranjan Changmai, Editor

Dr. Minu Buragohain

Ms. Tribeni Saikia

Dr. Kalyan Bhuyan

Dr. Jiban Saikia

Mr. Uttam Mahan

Mr. Dipankoj Gogoi

ORGANIZING COMMITTEE

PATRON :

Dr. Jai Krishna Mahanta, Principal, DHSK College, Dibrugarh -786001

CONFERENCE PRESIDENT :

Prof Gaurangadhar Baruah, Department of Physics, Dibrugarh University

VICE PRESIDENT :

Prof. Vinod Kumar Rastogi, Department of Physics, CCS University, Meerut

CONVENOR :

Dr. Ranjan Changmai, Department of Physics, DHSK College

CO-CONVENORS :

Dr. Jibon Saikia, J.B.College, Jorhat

Dr. Kalyan Bhuyan, Department of Physics, Dibrugarh University

SECRETARY :

Dr Minu Buragohain, Department of Physics, DHSK College

JOINT SECRETARY :

Dr. Jyotiprasad Phukon, Department of Physics, DHSK College

Mr. Uttam Mohan, Department of Chemistry, DHSK College

SESSION COORDINATORS :

Mrs. Tribeni Saikia, Department of Physics, DHSK College

Mr. Aditya Dahal, Department of Physics, DHSK College

Mr. Dipankoj Gogoi, Department of Chemistry, DHSK College

NATIONAL ADVISORY COMMITTEE

Prof. Kehar Singh, IIT, Delhi
Prof. A. Choudhury, Tezpur University
Prof. S.B. Rai, BHU
Prof. S.N. Thakur, BHU
Prof. D.K. Rai, BHU
Prof. Alike Khare, IIT, Guwahati
Dr. A.G. Barua, Gauhati University
Prof. S. Gunasekharan, Periyar University
Prof. R.S. Sirohi, Dehli
Prof. A.K. Ghatak, IIT, Delhi
Dr. G. Devi, NERIST, Nirjuli
Prof S. Mondal, Visva-Bharati
Prof P.N. Ghosh, Jadavpur University
Prof.Y.S. Jain, Shillong
Dr. Ayush Khare, NIT, Raipur
Prof. M.M. Bajaj, Delhi
Prof. Monmohan, Delhi
Dr. R. Baruah, NEIST, Jorhat
Prof. Ram Gopal, Allahabad University
Prof. Asima Pradhan, IIT Kanpur
Prof. Hariprakash, Allahabad University
Prof. A.K. Rai, Allahabad University
Prof. T. Ganguli, Kolkata
Prof. A.N. Singh, Varnasi
Dr. K.N. Uttam, Allahabad University
Prof. K.P.R. Nair, Thirivanthapuram
Prof. R. K. Gartia, Imphal
Prof. P.K. Mukahrjee, Jadavpur
Dr. V.N. Sarmah, Varnasi
Dr. R.N. Singh, Dehradun
Prof. A. L.Verma, Noida
Prof. S. N. Rai, Bangalore
Prof. Rupamonjuri Ghosh, JNU
Prof. P. S. Gupta, ISM, Dhanbad
Prof. J. Manam, ISM, Dhanbad
Prof. S. Soni, CCS University, Meerut
Dr. (Mrs.) Jaya V. Shukla, Delhi
Prof. G. Ahmed, Tezpur University

LOCAL ADVISORY COMMITTEE

Dr. P. Baruah, DHSK College
Dr. R. Tamuli, Sonari College
Dr. S. Rai, Dibrugarh University
Dr. P. Saikia, Dibrugarh University
Dr. P. Goswami, DHSK College
Dr. (Ms.) A. Phukan, DHSK College
Mr. N. Mahela, DHSK College
Dr. A. Ahmed, DHSK College
Prof. T. Gogoi, DHSK College
Mr. A.K. Dutta, DHSK College
Dr. D.P. Rajkhowa, DHSK college
Mr. A. Bharali, DHSKCollege
Mr. D. Hazarika, DHSK College
Dr. R. Bordoloi, Tinsukia College
Dr. R Konwar, Tinsukia College
Dr. D. P. Phukan, DHSK College
Dr. D. Neog, Dhemaji College
Dr. L. Borah, Duliajan College
Dr. N. Baruah, Duliajan College
Dr. (Mrs) Mitali Konwar, Moran College
Dr. (Mrs) S. Bhatachryaya, D.C.B.College
Dr (Mrs) Prity Borah, Moran College
Dr. Ritamoni Borah, Chiaduar College
Dr. Rajib Mahanta, Dibru College
Dr. Chandan Siam, Digboi College
Dr. Budhin Saikia, Titabor College
Dr. L. Khanikar, Titabor College
Dr. N. Dihingia, Dibrugarh University
Dr. (Mrs.) B. Saikia, JEC, Jorhat
Mr. R. Dubey, Dibrugarh University
Dr. Tulika Tamuli, Polytechnic
Dibrugarh

Prof.K.K. Deka, M.Sc., M.Ed., Ph.D. 'Stazorovka' (USSR)

Vice-Chancellor

DIBRUGARH UNIVERSITY

DIBRUGARH - 786004

ASSAM, INDIA

Phone : 0373-2370239 (O)

Fax : 0373-2370323

e.Mail : kkdekadu@yahoo.com



Message

Dear Dr. Changmai,

I am glad to know that you are going to organise a National Conference on Laser and Optical Science in collaboration with the Society of Laser and Optical Science from 11-13 October, 2010 at D.H.S.K. College, Dibrugarh. I am also glad to know that scientists from across the country shall participate in the Conference.

I hope that the Conference will provide excellent opportunities to the teachers, scientists and students to discuss their scientific contributions and share views among the participants.

I wish a grand success of the Conference.

With best wishes,

(K.K. Deka)

Vice - Chancellor

Dibrugarh University

Vinod Rastogi

Sectional President of Physical Sciences

Section (2010-2011).

Editor, Asian J Physics



Message

Indeed I am very much happy to associate myself with the organisation of 3 days national conference on Laser and Optical Science, which is being held in DHSK Colle, Dibrugarh, Assam, during Oct 11-13, 2010. On this occasion, let me first congratulate and extend my greetings to the young convenor of the conference, Dr. Ranjan Changmai, having chosen such an important topic. Such topics which are useful for the development of the mankind needs more deleberations, so that a common man can also understand and adopt the facilities achieved from the latest investigations. The theme of the conference is relevant in the world of today and I am confident that the delegates from all over the country will be able to discuss and explore new vistas in the field of LASER and OPTICAL SCIENCE. It is worthwhile to note that the conference is intended to commemorate the discovery of LASER in 1960, 50 years ago. LASER have been playing a key role in the progress of mankind and improve the quality of our life. I am looking forward to many more years of significant advancements in this exciting field.

I wish the conference a grand success and am confident that all of us, especially the younger generation, will be benifitted immensely from the deleberations of the experts and academicians of repute during the conference.

Vinod Rastogi

Prof. G. D. Baruah, Ph.D. (BHU) FLSS
President, Society for laser & Optical Science
President, Section of Physics,
85th Indian Science Congress,
Ex HOD
Department of Physics, Dibrugarh University
Emeritus Fellow (AICTE) UGC Fellow

Residence:
House No 50, Ward No 2
New Uchamati,
DoomDooma-786151, Assam
(M) 9854060861

Dated : 29-09-2010



Message

The primary purpose of the present national conference being organized by the department of physics, DHSK College is an attempt to expose the younger generation particularly the undergraduate students to the fascinating field of Quantum Optics, Laser and optical science to understand the quantum universe. The responsibility therefore lies on the shoulders of younger generation to take up the challenge. Quantum optics and Optical science underpins a great deal of Laser and optical Science. It may even be the vehicle by which we can realize a whole new technology by which quantum mechanics permits the processing and transmission of information. The so called entangled states are key parts for certain forms of quantum teleportation. These states are also responsible for the power of quantum computing. I hope the conference being organized by DHSK college in collaboration with the Society for Laser and optical science succeeds in its primary objectives.

G. D. Baruah
Prof. G. D. Baruah

Dr. J.K. Mahanta

Principal, DHSK College

Dibrugarh -786 001



Message

Incredible changes have been experienced by the people of the universe following the modern concepts and ideas promulgated and dispersed by the scientists of our age. In this regard we must acknowledge our indebtedness to the world of physics which is presently dominating the change and development through out the globe. Therefore to make this area of study and research more relevant, more intimate and more interesting and to transmit this noble idea from one to the other generation the necessity of discussion, conference etc are of immense importance

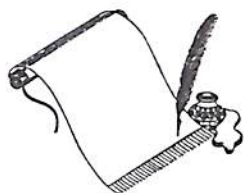
The primary goal of the present conference organized by the department of physics, DHSK College is Endeavour to shift the young generation, their interest and inquisitiveness, to the thrilling periphery of the quantum Optics Laser and Optical Science to step into the mystery of the quantum universe .

I sincerely hope and pray the almighty this Conference organized by DHSK College in collaboration with the Society for Laser and Optical Science might be a great success.

J.K. Mahanta

Dr. J. K. Mahanta

Foreword . . .



It is a great pleasure and privilege for us to organize the National Conference on Laser and Optical Science in collaboration with the society for Laser and Optical Science. This field is not only the largest field in contemporary physics but also crucial for understanding the nature, energy and dynamics of our cosmos. This conference will provide a platform to the Research workers and academicians as well as to the students (undergraduate and postgraduate) and young researchers to exchange their new ideas, explore emerging direction in both physics as well as on the applied aspects of the various areas of laser physics. It is also aimed at heighlhting new technologies.

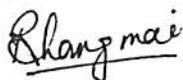
The conference has received a large number of contributions on various topics encompassing different areas of Laser Physics and Quantum Optics. It covers the results of both fundamental and applied research. There are 20 invited talks, 52 contributed papers in total. We are grateful to our invited speakers for their wholeheartened effort to give an account of the latest developments in their fields. We appreciate authours of contributed papers who have responded with great enthusiasm.

Further, it will be great pleasure for us to hold this National Conference under the presidentship of Prof. G. D. Baruah. The Society for Laser and Optical Science has been the brain child of Prof. Baruah. He has invaluable contributions in the development of Laser Physics and Quantum Optics in different areas. A large number of Ph. D and M. Phil students

from N. E. India have received training under his guidance in an important field like Laser Physics and Quantum Optics. We dedicate one session on the first day of this conference to felicitate him. We wish that the optical science community would receive his continuous guidance and support in coming days in this important field of human endeavour.

We are also grateful to our honourable Principal Prof. J. K. Mahanta for continuous support and encouragement. Our hearty thanks and regards are also due to the University Grants Commission Department of Science and Technology, Concil for Scientific and Industrial Research, , Oil India Limited and Oil and Natural Gas Commission who have offered financial assistance towards the conduct of this conference.

Organizing a National Conference of this dimension calls for co-ordinated team work and I am most grateful to my colleagues, office staff, students and wellwishers for the success of NCLAOS-10 is in large measure is due to their hard work and Cooperation



Dr. Ranjan Changmai

Convenor, NCLAOS-10

PHYSICS DEPARTMENT : D.H.S.K. COLLEGE A PROFILE

Dr. Minu Buragohain
Associate Professor
Department of Physics

On the bank of mighty Brahmaputra and touched by the first rays of the rising sun is the homely city of Dibrugarh. A seat of tranquil tea gardens and a site of modernity and dynamic change, Dibrugarh has played a historic and significant role in the enhancement of learning. In that context Dibrugarh Hanumanbux Surajmal Kanoi College has been a pioneer and facilitator of new knowledge in every field of education.

In the mid twentieth century a group of visionary intellectuals felt the need to establish a college cater to the growing demand for higher education amongst the youth of Assam. It was Late Ashiwini Charan Chowdhury, a teacher of erstwhile George Institution presently renamed Bagmibor Nilomoni Phukan who translated the vision into reality. A few eminent citizens joined in to initiate the project. In a meeting held on 28th May, 1945 in the premises of George Institution, a decision was taken to start an intermediate college in Dibrugarh to cater to the needs of the entire Lakhimpur district. The Dibrugarh College was thus established on 15th June 1945. Dr. Jogiraj Basu, the renowned scholar was the founder Principal, under whose able guidance it grew into an educational institution of repute. The college unit of ACTA commemorates Dr. Jogiraj Basu's invaluable contribution by organising annual J. R. Basu memorial lectures.

The Science stream in the intermediate level started in the year 1950-51 with the permission from Assam Government and classes were held in the Berry White Medical School presently in Graham Bazar. At that time with a generous donation from Raisaheb Hanumanbux Kanoi and his brother Surajmal Kanoi, the present building came into existence. Henceforth the college was renamed 'The Dibrugarh Hanumanbux Surajmal Kanoi College' on 25th July, 1950.

Dr. Sarvapalli Radhakrishnan, Philosopher, educationist, the first Vice-President formally inaugurated the new building on 29th December, 1958. In the same year a hostel for girl students was also built with the donations from citizens of Dibrugarh. This was a great step towards women's education. Classes of arts and commerce stream started in the new building from the session 1959-60. But the degree classes of science stream began in this building from 1960 onwards with Physics, Chemistry and Mathematics in the pass courses. Botany and Zoology were introduced in 1964 followed by Anthropology.

Over the years many stalwarts had served the Department. Some of them like Shri Haridev Goswami, Humen Borthakur, Nayana Randa Borthakur, Harihar Das, Shyma Prasad Sharma and other have worked as teachers and left this

college for better opportunities. Those who have served this college till their retirement are Shri Narendra Nath Choudhury, Dr. Gopi Ballab Lal Das, Shri Arun Kumar Dutta, Shri Dharendra Nath Baruah, Shri Abu Neim Bora and Dr. Madan Mohan Goswami.

At Present the Department is headed by Dr. Poresh Boruah. Dr. Minu Buragohain, Shri Aditya Dahal, Dr. Jyoti Prasad Phukan, Smti Tribeni Saikia and Dr. Ranjan Changmai are the faculty members. The first batch of the students majoring in the Physics passed out of this department in the year 1967. Since then as many as 43 batches of the students have graduated successfully. In the last seven years a number of students have obtained first class with distinction and have earned for the department and the college. We are also proud to say that last year (2009) the first and the second position of the university were obtained by the students of the department. The discipline and the training inculcated in the students by the teachers of the department have been responsible for the holistic development of the students. Many of the students who passed out from here are now presently serving as teachers in college and universities. Some are scientists in national and international institutions, some are presently at the helm of affairs in various job sectors. They have indeed done us proud.

The department of Physics has a very well equipped laboratory. It has two laboratories and a spacious dark room for degree students and a separate laboratory of higher secondary students. Presently the department has three laboratory assistants. The students hold regular fortnightly seminars and the eminent scholar are invited to deliver talks on some recent topics and to interact with the students. It is worth mentioning the Diamond Jubilee Celebration in 2007 started with a inaugural lecture on 'Nanotechnology' by renowned physicist and then Vice Chancellor of Gauhati University Dr. Amarjyoti Choudhury. 'Galaxy' the departmental wall magazine is maintained by the students and is renewed with new articles every year on Teachers' Day. Many writings of budding physicist find a place in the magazine. Students are encouraged to participate in short term courses and workshops. Ten students have participated in a 5 day Inspiration programme held in Tezpur University in June 2010. Another batch of Six students are planning to participate in a DST Sponsored SERC School on Modern Optics to be held at IIT, Guwahati from 10th to 23rd November 2010.

The department which is one of the oldest and has grown to its present stature has young and energetic teachers and brilliant students. So the need for organising a national level conference was acutely felt. This has led to the organisation of a 3 days conference on 'Laser and optical Science' (NCLAOS, 2010) from 11th to 13th October 2010. I would like to take this opportunity to express my sincere gratitude to all the sponsors, Principal of the college, esteem colleagues of the department and my dear students for making this conference a great success. Hope this conference will pave the way to many more conferences in other fields of Physics in the near future.

Invited Talk - 1

QUANTUM TELEPORTATION

Hari Prakash

*Physics Department, University of Allahabad, Allahabad, India
prakash_hari123@rediffmail.com*

Quantum Teleportation (QT) of single qubit using a maximally entangled two qubit state is explained. This is generalized to QT of N qubits and to use of non-maximally entangled states. Van Enk and Hirota scheme of QT using superposed coherent states giving success $\frac{1}{2}$ and its modification raising the success to almost perfect is explained. It is also shown that the decrease in entanglement may sometimes even result in increase in fidelity. It is also explained how this scheme can be modified for QT of more than one qubit.

Invited Talk - 2

SQUEEZING, HIGHER ORDER SQUEEZING AND ANTIBUNCHING OF PHOTONS IN SECOND HARMONIC GENERATION: AN ANALYTICAL APPROACH

Biswajit Sen and Swapan Mandal

*Department of Physics, Visva-Bharati, Santiniketan-731235, India,
Email: swapanvb@rediffmail.com*

We construct the equations of motion corresponding to pump and signal (Second Harmonic) fields in a second harmonic generation. By using a simple analytical approach, we obtain analytical solutions of those field operators up to the cubic orders in the interaction constant. In an appropriate limit (truncating the solution up to the second order in the interaction constant), these solutions lead to the existing solutions under short time approximation. The present analytical solutions are exploited to investigate the squeezing, higher order squeezing and the antibunching of photons in a second harmonic generation. Interestingly, for the second harmonic mode, we report the squeezing which is ruled out in the earlier investigation

FREQUENCY DOMAIN CORRELATION FILTERS FOR AUTOMATIC TARGET RECOGNITION

Asit K. Datta

*Retired Professor, Department of Applied Optics & Photonics
University of Calcutta, Kolkata*

Emeritus Professor, Aliah University, Kolkata

In last 20 years automatic target recognition (ATR) has become an active area of research for its potential military interest. Majority of systems whose primary interest is recognition and understanding of images emphasize on the analysis of the spatial representation of the images, the intensity value of images. While there has been varying and significant levels of performance achieved through the use of spatial 2-D data, the use of a frequency domain representation, sometimes achieves better ATR performance. The use of the Fourier transform allows to quickly and easily obtain raw frequency data which is significantly more discriminative (after appropriate data manipulation) than the raw spatial data from which it is derived. In this connection, a family of advanced frequency domain matching algorithms, collectively known as Correlation Filters (CFs) represents advances in frequency domain approach. Correlation filter offer several advantages over other model-based approaches. Firstly, it has built-in shift-invariance, i.e. if the input image is translated with respect to training images, the shift is easily detectable. Secondly, correlation filters are based on integration operation and thus offer graceful degradation in any impairment to the test image. Thirdly, correlation filters can be designed to exhibit attributes such as noise tolerance, high discrimination, etc. Finally, design of correlation filter is derived from closed form expressions. Moreover, optics/photonics techniques of instrumentation offer certain advantages of parallel non interactive processing in optical domain and therefore are better candidate for hardware implementation of frequency domain algorithms. For example, a lens system may provide Fourier transform of an image instantaneously, while the same work in a computer system may take several thousands of machine cycles. Therefore, photonic instrumentation derived from the basic frequency domain correlation approach shall provide certain advantages of speed vis-à-vis performance for ATR tasks. Frequency domain ATR is performed by cross-correlating an input image with a synthesized template

or filter and processing the resulting correlation output. The correlation output is searched for peaks, and the relative heights of these peaks are used to determine whether the object of interest is present or not. The location of the peak indicates the position of the object of interest. The paper presents some correlation techniques for automatic target recognition and its optical implementation. Some examples from real time scenario are included.

Invited Talk - 4

NONLINEAR PROCESSES IN QUANTUM DOT DUE TO LASER FIELD

Man Mohan and Siddhartha Lahon

Department of Physics & Astrophysics, University of Delhi, Delhi-110007, India.

Accurate non-perturbative Floquet theory is used to study non-linear multiphoton processes in quantum dot involving inter-band and inter-subband transitions resulted due to interaction with an intense Laser field. The inter-band transitions generate electron-hole pairs which in turn give rise to photocurrent useful for making multiphoton photodetector. We find the direct role of multiphoton absorption processes in quantum dots for enhancing the sensitivity and efficiency in bioimaging and photodetecting devices based on quantum dots (QD).

Invited Talk - 5

LIBS OF GALLSTONES OBTAINED FROM NORTH-EAST INDIA

A.K. Pathak¹, A.K. Rai¹, S. Rai² & G.D. Baruah²

¹*Department of Physics, University of Allahabad, Allahabad-211 002, India*

²*Department of Physics, Dibrugarh University, Dibrugarh, Assam-786 004, India*

"on leave from Department of Physics, Ewing Christian college, University of Allahabad, Allahabad-211 003, India

*Email: *awadheshkrai@rediffmail.com; ak_pathak1@yahoo.co.in, Tel. +91-532-2460993*

Present study emphasizes the study of gallbladder stones (gallstones) obtained from the patients of North-east region of India (Assam) using laser-induced breakdown spectroscopic technique. LIBS spectra of the different parts of gallstone samples have been recorded in air and argon atmosphere

for the spectral region 200-900 nm. Several elements like calcium, magnesium, copper, silica, phosphorous, iron, sodium and potassium etc. are detected in the gallstone samples. In addition to these elements lighter elements like carbon, hydrogen, nitrogen, and oxygen have also been detected. LIBS signal corresponding to all elements increase in argon atmosphere as compared to air. Presence of major and minor elements in gallstone samples is correlated with the common diets of people of the North-east India.

Key words: LIBS, Gallstone, Calcium.

Invited Talk - 6

FUTURE OF ELECTRONIC DEVICES: MOLECULAR ELECTRONICS

A. N. Singh

*Emeritus Fellow (U.G.C.), Spectroscopy Laboratory, Department of Physics
B.H. U. , Varanasi-221005*

The electronic devices has continuous decreased in size during the last century, starting with meter-sized vacuum valve tubes of the early 1930's and 1940's, through millimeter-sized transistors in the 1960's to micrometer-sized integrated circuits (microelectronics) in the 1970's and 80's. The microelectronics has also undergone relentless miniaturization during the past 25 years, leading to dramatic improvements in computational capacity and speed . But the end of that road is fast approaching, and scientists and engineers have been investigating another promising avenue: using individual molecules as functional electronic devices. Their nanometer-size and their ability to generate an electrical response to light may help the way to the development of molecular scale (Opto) electronic devices for communications, data processing and sensor applications. The present talk provides a glimpse of the activity of the area and possibility of its future developments.

OPTOGALVANIC & PHOTOACOUSTIC SPECTROSCOPY WITH LASERS

S. N. Thakur

Department of Physics, Banaras Hindu University

This is the Golden Jubilee year of the invention of laser and during this period the laser has pervaded almost all aspects of our lives. The knowledge gained from the studies in atomic and molecular spectroscopy played a very crucial role in the development of lasers which in turn enriched the experimental techniques of spectroscopy by its unique properties of monochromaticity, coherence and high intensity. The present talk would deal with the role of wavelength tunable lasers in the revival of two of the novel techniques of spectroscopy where spectra are recorded by measurements of fluctuations in discharge current and pressure. In 1930s Professor S S Joshi of Banaras Hindu University carried out a series of novel experiments by shining monochromatic radiation on electric discharge tubes. He found that radiation from a mercury arc incident on a discharge through mercury vapor led to a minute change in the discharge current. A large number of atomic and molecular vapors were used in the discharge tubes and the minute changes of discharge current were found to be positive as well as negative and this effect came to be known as "Joshi Effect". The extremely low intensities of the available monochromatic sources and fluctuations of electric supply made these experiments very difficult and also there was much criticism from the Indian spectroscopy community which stopped this type of investigations. In 1970s the availability of tunable dye laser sources and advances in electronic detection techniques made it possible to monitor the changes in discharge current as a function of the wavelength and this new technique was named as Optogalvanic Spectroscopy. It has great utility in exploring unstable atomic and molecular species in a discharge cell and also in the investigation of highly excited states of stable atoms and molecules. Photoacoustic spectroscopy came into great prominence after the advent of tunable lasers. It is based on the detection of heat generated by a sample following optical excitation. In some ways it is similar to absorption spectroscopy but the strength of a photoacoustic signal depends on the product of the absorption coefficient at a particular wavelength and the probability of the non-radiative decay from the optically excited quantum

state of the molecule. There are two methods of detecting the heat generated by the non-radiative decay in a sample. In the first method the periodic heating and cooling of the sample subjected to an intensity modulated incident radiation is converted into a pressure wave in a chamber of constant volume and is detected by a sensitive microphone. In the second method, used mostly for condensed phase samples the heat generated following optical excitation causes periodic expansion and contraction of a piezoelectric disk which is converted into electrical signals. Photoacoustic spectroscopy (PAS) does not require optically transparent samples and is, therefore, well suited for analysis of gaseous, liquid and solid samples with equal ease. Its main advantage is that spectra are obtainable on a variety of sample types which do not yield useful results by more conventional optical techniques.

Invited Talk - 8

DESIGNING OF LIGHT ENERGY CONVERSION DEVICES TO RESOLVE ENERGY CRISIS

Tapan Ganguly

Senior Professor, *Department of Spectroscopy*

Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700032, India

* email: tapcla@rediffmail.com / sptg@iacs.res.in

It is beyond doubt that photophysics and photochemistry will take central role in resolving the most important recent issue: Energy crisis. Most of the researchers throughout the world are now involved in making several solar or light energy conversion devices to get clean fuel and clean water. Our research group is now developing several novel light energy conversion devices which may serve as organic solar and photoelectrochemical cells. In contemporary materials research organic-inorganic nanocomposite systems are gradually becoming a highly exciting area. This type of research possesses strong technological relevance eg., for constructing of molecular photovoltaic cells, organic solar cells, organic light emitting diodes (OLEDs) etc. In our approach we tried to construct a new type of organic solar cell where the semiconductor TiO_2 nanoparticles have no direct participation as electron acceptor when the novel synthesized organic dyad is adsorbed on the nanosurface of TiO_2 as revealed from high resolution Transmission electron micrograph (HRTEM). Our research group also designed electrolyte-free

dye sensitized solar cells (DSSC). Though its efficiency is found to be of lower value than that observed in cases of electrolyte containing DSSC but the latter possesses several disadvantages. In electrolyte containing DSSC, less long-term stability along with the possibility of leakage or evaporation of electrolyte in cases of breakage of glass substrate makes us more interested in developing electrolyte-less DSSC. Quantum dots sensitized solar cells (QDsSSC) are also under progress. Laser flash photolysis technique was used to investigate the energy wasting charge recombination phenomena within the novel synthesized light energy conversion devices.

Invited Talk - 9

2, 4-DIFLUOROBENZONITRILE: AB INITIO CALCULATIONS, FT-IR AND FT-RAMAN SPECTRA

M A Palafox^a, Rashmi Tomar^b, Hitesh Kumar^c, J K Vats^c, R K Soni^d and V K Rastogi^c

^a *Departamento de Química-Física I, Facultad de Ciencias Químicas, Universidad Complutense, Madrid, Spain*

^b *Department of Physics, Meerut College, Meerut-250 001, India*

^c *Department of Physics, C.C.S. University, Meerut-250 004, India*

^d *Department of Chemistry, C.C.S. University, Meerut-250 004, India*

The idea of combining the theoretical and experimental results for predicting vibrational wavenumbers is not new, and a variety of different approaches have been suggested and reviewed recently [1]. Among the DFT methods, B3LYP which uses a combination of the exchange functional B (Becke) [2] and the correlation functional LYP (Lee, Yang, Parr)[3] gives accurate results specially in the case of F- and Cl- substituted benzonitriles. From the spectroscopy point of view benzonitrile and its mono- and disubstituted derivatives have been studied extensively [4 -18]. However, a vibrational analysis on 2,4-difluorobenzonitrile(2,4-DFBN) molecule has not been completely and rigorously studied yet, although its infrared bands have been analysed earlier. Therefore, the present investigation has been undertaken to study the vibrational spectra of this molecule completely and to identify the various normal modes.

FT-Raman spectrum of 2,4-DFBN was recorded at room temperature in the powder form in the region 50-4000 cm⁻¹ on a Bruker IFS 66 optical bench with an FRA 106 Raman module attachment. The sample was mounted

on the sample illuminator using an optical mount and no sample pretreatment was undertaken. The NIR output (1064 nm) of an Nd:YAG laser was used to excite (the probe) the spectrum. The instrument was equipped with a liquid-nitrogen-cooled Ge detector. The laser power was set at 100 mW and the spectrum was recorded over 1000 scans at a fixed temperature. The spectral resolution was 6.0 cm⁻¹ after apodisation.

The mid-infrared region spectrum of the compound from 400-4000 cm⁻¹ was recorded with a Perkin Elmer FTIR model 1760 X instrument, using the KBr technique with 1 mg sample per 300 mg KBr. For the spectrum acquisition, four scans were collected at 4 cm⁻¹ resolution.

Geometry, vibrational frequencies, atomic charges and several thermodynamic parameters (the total energy, the zero point energy, the rotational constants and the room temperature entropy) were calculated using ab initio quantum chemical method. Specific scale factors were also deduced and employed in the predicted frequencies.

An accurate assignment of the vibrational bands was carried out with the help of B3LYP ab initio method and a reassignment of several fundamentals was performed. The specific scale factor procedure gives rise to a more noticeable improvement on the predicted frequencies than when scaling equations are used. The nitrile stretching frequency appears at 2240 cm⁻¹ in IR and at 2230 cm⁻¹ in Raman in agreement with its scaled value at 2272 cm⁻¹. This frequency is highly localized within the CN group because the potential energy distribution (PED) for this wavenumber contains contributions from the C-CN (12 %) and $\dot{C}N$ (87%) stretching force constants only. Further, as reported in other benzonitriles, this stretching mode appears with the strongest Raman intensity.

References

1. Palafox M A, Recent Res Dev Phys Chem, 1998, 2, 213.
2. Becke AD, Phys Rev, A38 (1988)3098.
3. Lee C, Yang W, Parr R G, Phys Rev, B 37 (1988)785.
4. Rastogi V K, Mittal H P, Sharma S N, Chattopadhyay S, Indian J Phys, 65 B(1991)113.
5. Rastogi V K, Arora C B, Singhal S K, Singh D N, Yadav R A, Spectrochim Acta, 53A (1997)2505.
6. Rastogi V K, Palafox M A, Singh S, Singhal S K, Asian J Phys, 7 (1998)229.

7. Rastogi V K, Palafox M A, Lal B, Jain V, Indian J Pure Appl Phys.
8. Palafox M A, Rastogi V K, Singh C, Tanwar R P, Spectrochim Acta, A57(2001)2373.
9. Rastogi V K, Jain V, Palafox M A, Singh D N, Yadav R A, Spectrochim Acta, A57(2001)209.
10. Rastogi V K, Palafox M A, Tanwar R P, Mittal L, Spectrochim Acta, A58(2002)1987.
11. Palafox M A, Rastogi V K, Mittal L, Int J Quantum Chem, 94(2003)189.
12. Palafox M A, Rastogi V K, Vats J K, J Raman Spectrosc,37(2006)85.
13. Rastogi V K, Singhal S, Rao G, Palafox M A, Natl Acad Sci Lett, 29(2006)445.
14. Palafox M A, Rastogi V K, Mittal Lalit, Kiefer W, Mital H P, Int J Quantum Chem,106(2006)1885.
15. Rastogi V K Palafox M A, Singhal S, Ojha S P, Kiefer W,Int J Quantum Chem, 107(2007)1099.
16. Rastogi V K, Singhal S, Kumara A Pawan, Rao G R, Palafox M A, Kostova I, Indian J Pure Appl Phys, 47(2009)844.
17. Rastogi V K, Sighal S, Palafox M A, Ramana Rao G R, Indian J Phys,84(2010)151.
18. Kumar V, Panicker Y, Palafox M A, Vats J K, Kostova I, Lang K, Rastogi V K, Indian J Pure Appl Phys, 48(2010)85.

Invited Talk - 10

RECENT ADVANCES IN MICROWAVE SPECTROSCOPY

K P Rajappan Nair

It is well known that Spectroscopy especially microwave spectroscopy is a major physical tool in the determination of molecular structure and molecular interactions. This in turn helps in unravelling the vast area of chemical structure and chemical properties of molecules and compounds and also in unravelling the enormous unreachable interstellar space. Microwave spectroscopy can make the most precise measurements of small splitting arising from fine, hyperfine and internal rotation interactions in the rotational spectrum, the analyses of which give information on the molecular orientation, electronic distributions and the overall properties of molecules.

This will give precise frequency determination in the microwave and millimetre wave region, which in turn helps in detecting the astrophysical molecules. The fine structure is caused by the electron spin-rotation interaction, the hyperfine structure by nuclear spin-rotation interaction and the internal rotation by the interaction of the rotation of certain part of the molecule with respect to the other part. The changes in the rotational spectra caused by these interactions can be easily studied by microwave spectroscopy¹.

Microwave spectroscopy is one of the major fields in which physics has made the greatest strides. The concentrated research on microwave radars provided the necessary instruments and impetus for the rapid development of the field, though microwave spectroscopy had its inception in 1934 with the historic experiments on the inversion spectrum of ammonia. Incidentally the same inversion spectrum of ammonia gave birth to the new world of lasers, first by observing the so-called maser. Spectroscopy has been powerful tool in studying the physical and chemical nature of the Universe ever since the discovery of spectrum by Sir Isaac Newton in 1666. Many molecules showing maser actions have also been detected in the interstellar media. Although most of the work of radio astronomers had been concerned with the measurements of radio noise at different frequencies coming from the interstellar space, there is a discrete spectral line of atomic hydrogen at a wavelength of 21cm, which has been discovered and used very widely by them. Even though the spectrum of atomic hydrogen is simple and was subject of studies by well known scientists like Rutherford, Thomson, Bohr, Schroedinger and others for providing various theories of atomic structure, the origin of the 21 cm line escaped the notice of these people, which lies at the microwave frequency of 1420 MHz. In order to identify and look for compounds in stellar and interstellar media it is necessary to have laboratory studies on these molecules. The resolution in microwave spectra has considerably increased with the introduction of Fourier Transform Molecular Beam Microwave Spectrometer (FTMBMW) and frequencies can now be measured better than an accuracy of 1 kHz.

The recent microwave spectroscopic studies in laboratory on a number of molecules will be presented and a detailed description of interstellar molecules as studied by radio astronomy will also be presented.

¹K. P. R. Nair, *Atoms, Molecules and Lasers: Alpha Science International Oxford and Narosa, New Delhi (2006, 2008)*

Invited Talk - 11

QUANTUM INTERFERENCE LASER

G.D.Baruah

Department of physics , Dibrugarh University

Since the realization of Lasing without inversion (LWI) enables one to obtain laser generation in very short wavelength transition where atomic population inversion is difficult to achieve, a large number of laser models that can operate without population inversion have been proposed. The basic idea behind all these models is to modify the emissive and absorptive profiles with the help of a quantum interference effect. We have worked out a vector model for quantum interference Laser for the first time, and shown how Weisskopf-Wigner spontaneous emission can be interpreted with this model.

Invited Talk - 12

SYNTHESIS AND CHARACTERIZATION OF EARTH ACTIVATED GLASSY, CERAMIC/PHOSPHOR AND POLYMERIC MATERIALS: FUTURISTIC PHOTONIC MATERIALS

S. B. Rai

Department of Physics, Banaras Hindu University, Varanasi-221005, India

Rare earth activated photonic materials have various technologically important applications viz. in lighting (compact fluorescent lamps (CFL), light emitting diodes (LED), white light emitting diodes (WLED)), in optoelectronic devices (plasma display panels (PDP), flat panel displays (FPD), high definition televisions (HDTV)), in biomedical applications (bio-tagging and bio-imaging), as sensors (viz. temperature and magnetic field), in security applications and many more others. Present talk will focus on some of our recent research work on these materials.

MICROWAVE ABSORPTION QUANTUM EVAPORATION FROM SUPERFLUID HELIUM, -A PHASE CORRELATED STATE OF HELIUM ATOMS LIKE PHOTONS IN LASERS

Y. S. Jain

Department of Physics, North-Eastern Hill University, Shillong, Meghalaya -793 022, India.

Superfluid state of liquid helium-4 has been a subject of great interest for the last seventy years for its unique properties, viz., its flow through narrow channels without resistance, its infinitely high thermal conductivity, etc., arising from wave nature of helium-4 atoms. Recently, the superfluid state of trapped dilute gases has been found to have inter-atomic phase correlations identical to that of photons in lasers and this has motivated a large section of physics community to develop what are known as atom lasers. Conventionally, superfluid state is related to Bose Einstein condensate (BEC) which represents a state of macroscopic fraction of atoms presumably occupying single particle state of momentum $p=0$. However, in recent years several experimental observations have seriously questioned this belief. They unequivocally support a nonconventional theory which concludes : (i) that each particle in the superfluid state represents a state of pair of particles moving with equal and opposite momenta ($q, -q$) with respect to their center of mass (CM) which moves with momentum K in the laboratory frame, (ii) these particles have their BEC below certain temperature in a state of $p= h/2d$ where d represents the average nearest neighbor distance, (iii) the particles have inter-particle phase correlation identical to that of photons in lasers, (iv) they define a close packed arrangement of their quantum wave packets which only allows them to have a motion in order of their locations with no relative or collisional motion, hence no viscosity, (v) they all have identically equal energy/momentum, etc. Having discussed this theory briefly, we discuss in detail two experiments, viz. the microwave absorption in superfluid helium-4 in the presence of external electric field and quantum evaporation of helium atoms from the surface of superfluid helium-4 and unequivocally conclude that superfluid state of helium-4 and BEC state of trapped dilute gases do not have any particle with momentum $p = 0$; all particles temperature $T=0$ have momentum $p=h/2d$. The conventional belief of the existence of $p=0$ particles is nothing but a myth

Invited Talk - 14

EFFECT OF CdS NANOPARTICLES ON RARE-EARTH IONS DOPED IN SILICA GLASSES

S. Rai

Department of physics, Dibrugarh University, Dibrugarh 786004

Email: sr.ai.ra.i677@gmail.com

We have investigated the effects of nanometer-sized CdS particles on the optical properties of Eu^{3+} , Tb^{3+} and Sm^{3+} ions in SiO_2 glass. Glass was prepared by the Sol-gel method. An enhancement of the rare earth luminescence has been reported by interaction with CdS nanoparticles. The structural modifications involve different strengths in the rare-earth-CdS interactions. The results showed that the photoluminescence of doped silica xero-gel was significantly dependent of concentration of CdS nanoparticles. In this talk attempts will be made to explain the effects of these interactions of rare earth luminescence.

Invited Talk - 15

THE LIGHT OF THE FIREFLY

A. Gohain Barua

Department of Physics, Gauhati University, Guwahati-781014, Assam

The firefly is by far the most efficient example of a bioluminescent system discovered to date. Numerous investigations have been carried out on the spectral distribution of its bioluminescence. Its spectacular flashing has also been the subject of a few time-resolved studies. It has recently been discovered that fireflies emit microsecond-duration pulses, and that these pulses are manifestations of an oscillating chemical reaction. In this talk, these aspects of the light of the firefly will be covered. Also, based on diffraction and interference patterns, produced by a grating and two closely spaced pin holes respectively, a proposition will be made about the coherence of this light

APPLICATION OF MIE THEORY

Gazi A Ahmed

Department of Physics, Tezpur University, Tezpur 784028, Assam, India

We have attempted the application of Mie theory [1,2] in order to explain light scattering experimental results[3,4] from collections of small particles of spheroidal and non-spheroidal shapes. The interpretation of the scattering from collections, in comparison to single particles, poses a challenge as it involves volume scattering elements with size distributions. It is in this regard that computational techniques become very useful in interpretation of the data. We have also attempted Monte Carlo simulation of these light scattering phenomenon for the added benefit that it becomes possible to corporation error factors in predicting light scattering patterns. Special emphasis has recently been given to the light scattering properties of diatoms because of their potential applications in nanoscience.

References

- [1] C. F. Bohren and D. R. Huffman. Absorption and Scattering of Light by Small Particles. New York: Wiley (1983).
- [2] M. I. Mishchenko, J. W. Hovenier, and L. D. Travis (editors). Light Scattering by Nonspherical Particles: Theory, Measurements, and Applications. San Diego, California: Academic Press (2000).
- [3] A. Gogoi, A. K. Buragohain, A. Choudhury, G. A. Ahmed. Laboratory measurements of light scattering by tropical fresh water diatoms. Journal of Quantitative Spectroscopy & Radiative Transfer 110, 1566- 1578 (2009).
- [4] A.Gogoi, L.J.Borthakur, A.Choudhury, G.A.Stanciu and G.A.Ahmed, Detector array incorporated optical scattering instrument for nephelometric measurements on small particles, Measurement Science and Technology, 20, 1-10 (2009).

Invited Talk - 17

ENGINEERING OF ORGANIC NLO MATERIALS AND CRYSTAL GROWTH FOR LASER APPLICATIONS*

R. N. Rai

Department of Chemistry, Banaras Hindu University, Varanasi-221 005, India

Studies on organic nonlinear optical (NLO) and electro-optic (EO) materials have received much attention to that of inorganic materials. The extensive efforts are being made to engineering the efficient organic molecules for laser and various optical applications. It is important to understand the nonlinearity in molecule as function of size of molecule, planarity of molecules as well as number-, position- and strength of donor/acceptor group attached with molecule. The organic materials have also known for various other optical applications such as white LED, photovoltaic, terahertz frequency producer, etc. However, growing the single crystal of sufficient large size and optical quality is still a challenge for crystal grower and scientific community.

The various strategies for the synthesis of efficient organic NLO materials would be emphasized. Studies about limitations and appropriateness of different techniques of crystal growth, particularly, for organic materials will be communicated and the role of study of physical properties of materials in selection of crystal growth techniques will also be narrated.

** The study is financially supported by BRNS, DAE, BARC, Mumbai.*

Invited Talk - 18

LASER NEAR THRESHOLD

Rajen Tamuli

Sonari College, Sonari, Sibsagar

email : tamulir@gmail.com

The laser oscillation near a threshold has been the subject of theoretical and experimental interest since past several decades. In the present work we offer a comparative study of three models (W-B), (G-H) and (S-L) that describes the thresholds behaviors of laser oscillation near threshold.

LASER IN OPHTHALMOLOGY: ITS APPLICATION ON CORNEA, IN GLAUCOMA AND CATARACT

Rajendra Nath Gogoi, MS (Ophth),

Dept. Of Ophthalmology, Assam Medical College, Dibrugarh

Ophthalmology is the first branch of Medicine where Laser was used clinically. Various kinds of Laser are being used for different conditions and diseases of the eye. This presentation will discuss about the various applications of laser on the Cornea as well in clinical conditions of glaucoma and cataract. On the cornea its applications are mainly to reshape its curvature, thereby correcting different refractive errors. Excimer and Femtosecond lasers are used to accomplish this. In case of Glaucoma, a condition where the intraocular pressure (IOP) rises above normal, causing irreversible damage to the optic nerve, Laser has a major role to play in lowering the IOP. Argon Laser Trabeculoplasty and Selective Laser Trabeculoplasty are the procedures done for lowering the IOP. In Primary Angle Closure Glaucoma, a particular type of Glaucoma, we can prevent an acute congestive attack by doing a peripheral iridotomy by Nd: yag laser. In case of cataract, though laser has a limited role to play as far as removal of the cataractous lens is concerned, with the advent of femtosecond laser cataract surgery may take a different shape altogether in the near future. In case of Posterior Capsular Opacification (PCO), a condition that occurs after cataract removal and posterior chamber intra ocular lens (IOL) implantation, Nd: yag laser is invaluable in getting rid of the opacification. With so much of applications through different types of laser, modern Ophthalmology is unthinkable without laser.

THE POLYCYCLIC AROMATIC (PCA) MICRO DOMAIN IN COAL: AN X-RAY SCATTERING STUDY

R K Boruah

*North East Institute of Science & Technology
Jorhat 785 006, Assam, India*

Coal is an organic rock consisting of macro molecules of high molecular weight. This report is an attempt to understand the short-range structural features to determine the relationship(s) between the aryl/alkyl carbon ratios and to determine the size of the average polycyclic aromatic unit in coal. An x-ray scattering analysis of the average polycyclic aromatic unit in the coal collected from Ledo colliery, Makum coalfield, Assam, India, indicates that the aromatic fraction in the coal is 74% with the aliphatic fraction correspondingly estimated to be 26%. The average carbon atom has 2.3 nearest carbon atom neighbors at an average bond distance of 1.50(1) Å. The average stacking height of the parallel aromatic layers and the average diameter of the aromatic layers are estimated to be 7.58 and 4.86 Å respectively. For this coal, the average number of stacking layers and the average number of atoms per layer are estimated to be 2 and 8 respectively. In addition the Gamma band is observed at d' value of 4.42 Å.

Oral Presentation - 1

HIGHER ORDER ANTIBUNCHING IN SPONTANEOUS RAMAN AND IN STIMULATED RAMAN PROCESSES

Biswajit Sen¹ and Swapan Mandal²

¹*Department of Physical Sciences, Vidyasagar Teachers' Training College, Midnapore-721101, India*

²*Department of Physics, Visva-Bharati, Santiniketan-731235, India*

The analytical solutions up to the second order in coupling constants of various field modes for spontaneous Raman and for stimulated Raman processes are obtained. These solutions are used to investigate the higher order antibunching effects of photons.

Oral Presentation - 2

STUDY OF VIBRATIONAL SPECTRA AND STRUCTURE OF MALARIA DRUGS DARAPRIM (PYRIMETHAMINE) AND SULFADOXINE

Anup Kumar¹, Geh Wilson Ejuh^{2,3}, Ndjaka Jean Marie³ and A.N.Singh⁴

¹*Physics Department, Sarada University, Greater Noida*

²*Physics Department, Gombe State University, Gombe, Nigeri*

³*Ndjaka Jean Marie, Universite' de yaounde' des Sciences, Department de Physique B.P.812 Yaounde', Cameroun.*

⁴*Laser and Spectroscopy Laboratory, Department of, B.H.U., Varanasi*

Vibrational spectra of the Malaria drugs Daraprim (Pyrimethamine) and Sulfadoxine have been systematically investigated by combined approach of infrared and density functional theory (DFT) calculations. The infrared spectra of the molecules in KBr pellet has been recorded in the wave number region 400-4000 cm^{-1} . Optimized geometries, harmonic vibrational wave numbers and the intensities of the vibrational bands have been calculated at the RHF/6-311++g** and B3lyp/-311++g** levels. Some appropriate scale factors have also been considered to scale the calculated frequencies. The scaled values have also been compared with experimental frequencies observed in infrared spectrum. All vibrational frequency has been assigned to their corresponding normal mode with the help band intensities and vector displacements. IR vibrational frequencies and their intensities so obtained have been discussed.

Key words : Malaria Drugs Daraprim (Pyrimethamine) and Sulfadoxine, IR spectrum, DFT and ab initio methods.

Oral Presentation - 3

DOPLER CONTROLLED OPTICAL NUTATION AND QUANTUM SUPERPOSITION OF TRANSITION PROBABILITY

* R. Bordoloi, **R. Bora and G. D. Baruah

Physics Department, Dibrugarh University, P.O. Dibrugarh, Assam - 786004, India.

**Physics Department, Tinsukia College, P.O. Tinsukia, Assam - 786125, India*

***Physics Department, Namrup College, P.O. Parbatpur, Assam - 786623, India*

In this work we have presented a simple graphical way of representing the behavior of a two - level atomic system in presence of a near resonant electromagnetic field. This approach is based upon semi classical formulations of equations of motion and their solutions. Interaction of matter with near resonant radiation field has been studied. Equations of motion for the interacting atomic / molecular dipoles have been derived and solved using RWA. The time evolution of the transition probability (wave function) is being studied under the influence of thermal Doppler broadening. The presence of other relaxation processes has been ignored as they bear little significance in a system which is continuously being irradiated by a near resonant electromagnetic field. We have shown that the behavior of "Transition probability (Inversion)" is different in resonant and near resonant cases. We take near resonant situation as in a system not free from Doppler broadening it is virtually impossible to get exact resonance.

Reference :

1. H. Goldstein, Classical Mechanics, (Narosa Publishing House, New Delhi 1989).
2. Allen and J.H. Eberly, Optical Resonance and Two Level Atoms. (John Willey & Sons. N-Y, 1975).
3. Amnon Yariv, Quantum Electronics, (John Willey & Sons. N-Y, 1975).
4. F. Bloch, Phys. Rev. 70, 460(1946).
5. M Sargent, M.O. Scully and W.E. Lamb, Laser Phys. (Addison Wesley Publishing Co. Advanced Book Program Reading, Massachusetts, 1974).

PERSISTENT BAND HEADS OF N_2 MOLECULE AT (12,7) AND (11,6) IN LASER INDUCED FLUORESCENCE OF MOLLUSCAN SHELLS

R. Konwar¹ and .G. D. Baruah²

¹*Department of Physics, Tinsukia College, Tinsukia-786125*

²*Department of Physics, Dibrugarh University, Dibrugarh-786004*

E-mail: konwar-rajib@rediffmail.com

In the present work we consider the fluorescence spectra of a type of stratified media or substances of biological origin known as molluscan shell. Sea shells and molluscan shells have attracted the attention of researchers for many interesting physical phenomena exhibited by these objects. The study of the shells is also important and fascinating subject because the shell is created by a living pulsating creature around itself as a cover for defense and it represents some sort of permanent phase which is irreversible. The materials of the molluscan shells present different appearances at different cases. It is hard, and white in shark, translucent in window pane oyster and beautifully lustrous and iridescent in mother of pearl. Little is known of the process of calcium carbonate formation and crystallization in the molluscan shells. Nature has plenty of examples that suggest that biological synthesis might be in many ways superior to conventional human synthesis of materials. The shell of a molluscan built out of calcium carbonate has 3000 times higher fracture resistance than crystals of calcium carbonate. Laser induced fluorescence of number of molluscan shells have excited with the help of a Ar^+ laser (500mV) in the wavelength of range of 5800 to 6400Å. The salient feature of the LIF is that the persistent lines at 5407.1Å (11.6) and 5372.8Å (12.7) belonging to the first positive band of N_2 molecule have been observed. The presence of persistent lines of N_2 is indicative of the characteristic protein inside the shells.

SOLVENT DEPENDENT STUDY OF ISOTROPIC RAMAN BAND IN C=O CONTAINING MOLECULES: VIBRATIONAL RELAXATION RATES

Th. Gomti Devi

North-Eastern Regional Institute of Science and Technology

Nirjuli-791109, Arunachal Pradesh

Email: devigomti@yahoo.co.in

Isotropic Raman component of C=O stretching mode of Acetone was analyzed using various polar and non-polar solvents. It was found that the band shape approaches towards Lorentzian at high dilution using curve fitting method. The isotropic Raman band was also analyzed by estimating the correlation coefficient with reference to Lorentzian lineshape using a simple method of linear curve fitting. The vibrational relaxation rate was studied using certain parameters and it was found that the microscopic based parameter can explain the complexities occurring in solute-solvent interactions.

FLUORESCENCE DYNAMICS OF Tb³⁺ AND Tb³⁺/Er³⁺ DOPED Al(NO₃)₃-SiO₂ SOL-GEL GLASSES

Pankaj Dutta and S.Rai

Laser and Spectroscopy Laboratory, Department of Physics,

Dibrugarh University, Dibrugarh-786 004

Email: dutta.pankaj@rediffmail.com, rai_s@lycos.com

Fluorescence dynamics of the ⁵D₄ Tb³⁺ ion level in Al(NO₃)₃-SiO₂ glasses co-doped with Er³⁺ have been experimentally investigated with the help of classical Forster- Dexter model for the energy transfer between Tb³⁺(donor) and Er³⁺ (acceptor) . The energy transfer rates between Tb³⁺ and Er³⁺ were calculated on the basis of above measurements. The samples were prepared for fixed Tb³⁺ concentration at 0.01M while keeping the Er³⁺ concentrations at 0.009M, 0.01M and 0.02M respectively. The results confirm that the energy transfer occurs between the ⁵D₄ Terbium level and ⁴F_{7/2} Erbium level and is a phonon assisted dipole-dipole interaction.

Oral Presentation - 7

GROWTH AND OPTICAL PROPERTIES OF CHROMIUM DOPED ZnS NANOSTRUCTURES

D. P. Gogoi, G.A. Ahmed, A. Choudhury

*Nano Science Laboratory, Department of Physics, Tezpur University,
Tezpur-784028, Assam*

Adopting chemical solution route, Cr doped ZnS nanostructures embedded with Polyvinyl alcohol and Polyvinyl pyrrolidone have been fabricated. The growth of nanostructures have been confirmed through Transmission Electron Microscopy and X-Ray Diffraction. The optical properties were characterized by using UV-Visible spectroscopy and Photoluminescence spectroscopy. For both dielectric hosts, UV-Visible studies reveal clear blue shift due to strong quantum confinement effect. We report that the Photoluminescence peaks around 425nm and 490 nm are due to the trap states arise as a result of sulfur vacancy and zinc vacancy.

Oral Presentation - 8

LABORATORY MEASUREMENTS ON GRAPHITE AND CARBON BLACK PARTICLES IN SINGLE SCATTERING CONDITIONS

Ankur Gogoi^{*,1}, Dikshita Saikia², Amarjyoti Choudhury¹ and Gazi Ameen Ahmed¹

*¹Optoelectronics and Photonics Laboratory, Department of Physics
Tezpur University, Tezpur - 784028, Assam, India*

²Department of Energy, Tezpur University, Tezpur - 784028, Assam, India

**Corresponding author: ankurgogoi@gmail.com*

We report the measurement of optical scattering properties of ultra-fine graphite and carbon black particles at 543 nm, 594 nm and 630 nm laser wavelengths by using an improved light scattering setup. The particles were sprayed into the laser beam by using an indigenously developed aerosol nebulizer. The setup incorporates an array of sixteen highly sensitive static Si detectors that measured scattered light signals from 100 to 1700 in steps of 10. The whole experiment was done in single scattering conditions and in differential mode. The experimental results were verified by comparing with theoretically generated T-matrix plots for graphite and carbon black particles of same shape and size. The results agreed qualitatively well for both measured and theoretically calculated values within acceptable limits of deviation.

Significant variation of the light scattering behavior of both the samples was observed for the three different laser wavelengths.

Keywords: Light scattering, laser, graphite, carbon black.

References :

1. Ankur Gogoi, Lakhya J Borthakur, Amarjyoti Choudhury, George A Stanciu and Gazi A Ahmed. Detector array incorporated optical scattering instrument for nephelometric measurements on small particles. *Meas. Sci. Technol.* 20, 095901 (10pp), 2009.
2. G.A. Ahmed. Design considerations of a laser based air quality monitoring system coupled

Oral Presentation -9

THERMALLY DEPOSITED Ag DOPED CdS THIN FILM TRANSISTORS

P Gogoi and R Saikia

Dept. of Physics, Sibsagar College, Joysagar-785665, Assam.

In the recent years, thin film transistors (TFT) are widely used in display technology. Particularly in Active Matrix Liquid Crystal Displays (AMLCD), TFTs play the key rule. In this investigation the performance of CdS thin film transistors having 50 μm channel length, doped with Ag has been studied. The TFTs are fabricated in coplanar electrode structure on ultrasonically cleaned glass substrates by thermal evaporation process. Rare earth oxide La_2O_3 is used as gate insulator and Al as source, drain and gate electrodes. Some important electric parameters of the TFTs, like transconductance, output resistance, amplification factor, gain band-width product etc are evaluated from the I-V characteristics using suitable theoretical model.

Key Words: CdS TFT, Ag doped, La_2O_3 , electrical parameters.

Oral Presentation - 10

PHASE TRANSITIONAL STUDIES IN MODEL PRECURSOR LIQUID CRYSTAL POLYMER

B. Gogoi

Department of Physics, Tinsukia College Tinsukia 786 125 (INDIA)

The model precursor compounds of liquid crystal polymer attracted a great deal of interest in recent years both theoretically and experimentally. One of such type of series of compounds, α,ω bis (4-alkylanilinebenzylidene-4 -oxy) alkane or m.OnO.m has been selected for the present study due to their unusual properties. As a part of the systematic study it is reported here the phase transition studies of m.OnO.m series of compound viz. 6.O5O.6 using Differential Scanning Calorimeter and Impedance Analyzer as a function of temperature. The study indicates a large discontinuity in the isotropic - mesosphere transition confirmed the first order transition.

Key words: liquid crystal; phase transitions; dielectric permittivity; dielectric loss.

Oral Presentation - 11

VERTICAL DISTRIBUTION OF AEROSOLS OVER DIBRUGARH AS OBSERVED FROM A SPACE BORNE LIDAR

Binita Pathak, Munmi Saikia, Gayatry Kalita, K Bhuyan

Centre for Atmospheric Studies, Department of Physics, Dibrugarh University, Dibrugarh 786004 Assam, India

Among various climate forcing agents like Green House Gases, atmospheric Ozone etc., aerosols are one of the crucial constituents of the earth's atmosphere, contributing to global climate change. Due to large uncertainty in global distribution and mixing states of aerosols, knowledge of the effect of aerosols on climate is limited to a large extent. This is also due to large heterogeneity in aerosol properties and inadequate data from regions of interest. In this context, measurements and study of the aerosol properties from a rural seemingly unpolluted region like Dibrugarh assumes significance as this may provide background information on the measurements made at urban and highly polluted regions. From the backscattered signals of a LIDAR (Light Detection and Ranging) using different inversion techniques, the physical and optical properties of atmospheric species such as aerosols and clouds can be remotely retrieved. A satellite mission named the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) was launched

in April 2006, flying at an altitude of 705 km with an orbital inclination of 98° and crossing the equator at 13:30 IST. The primary payload on the CALIPSO satellite is a two-wavelength, polarization-sensitive backscatter Lidar known as the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP). The Lidar profiles provide information on the vertical distribution of aerosols and clouds, cloud particle phase and classification of aerosol size, helping to clarify their climatic role and radiative effects on a global scale. The CALIOP laser transmitter subsystem transmits laser light simultaneously at 532 nm and 1064 nm at a pulse repetition rate of 20.16 Hz. The CALIOP receiver subsystem measures backscatter intensity at 1064 nm and at two orthogonally polarized components of the 532 nm backscattered signal. The backscatter profiles from CALIPSO over Dibrugarh and adjoining areas reveal presence of an elevated aerosol layer within the altitude range of 3-5 km. The elevated layer is extremely prominent in pre-monsoon (March-May), in winter (December-February) the layer height reduces to 2-3 Km. In the other two seasons, less prominent peak in elevated layer is observed presumably due to removal of aerosols from the atmosphere by rain. Transportation of aerosols from west Asia, Mainland of India etc. along with minimal wet removal process are responsible for this observed elevated aerosol layer in the pre-monsoon season.

Oral Presentation - 12

SOFTWARE APPLICATION TO REDUCTION OF SETTLING TIME IN THE INDUSTRIAL APPLICATION LASER

K.Bora^a and T. Bezboruah^b

^b*Department of Electronics & Communication Technology, Gauhati University.*

^a*Department of Physics Dhemaji College, Dhemaji, Assam, India.*

E-mail: zbt093@gmail.com/ borakumud@gmail.com

To influence the build time, such as roller travel speed, build height, laser scan speed, scan area etc from distant place can be achieved by reducing the settings of the build package, rather than on details of individual scan surfaces. The system used in the receiver to recover the message signal from distorted signal- equalizer in cascade with low pass filter is used in acquisition. The proposed work describes the software implementation of Proportional-Integral-Derivative (PID) control Phase-Lock-Loop (PLL) to reduce the settling time in acquisition. Simulation results shows that the method enable to reducing the settling time up to 94% for second order, 49% for third order PLL in 0.9GHz frequency range.

Keyword: Build time, PID controlled, PLL, Settling time, Acquisition

STRUCTURAL AND OPTICAL PROPERTIES OF NANOCRYSTALLINE CdSe FILMS PREPARED BY CHEMICAL BATH DEPOSITION METHOD

Sumbit Chaliha¹, Digonta Pd Gogoi¹ and M N Borah²

¹Dept. of Physics, Bahona College, Jorhat-785101, India

²Dept. of Physics, D. R. College, Golaghat-78562, India

e-mail: sumbit.c@rediffmail.com

Nanocrystalline thin films of CdSe are prepared on glass substrates by chemical bath deposition method from an aqueous alkaline medium at room temperature for different molarity. The structural properties of prepared films were studied by X-ray diffraction method and the crystalline sizes determined from FWHM of diffractograms are found to vary from 2.1 nm to 5.2 nm. The absorption spectra of the smaller crystals are studied with the help of U-V spectrometer and the band gaps determined from these spectrograph are found to be within range from 2.05 to 1.9 eV as grain size decreases. This reveals the blue-shift, which is due to size quantization. An increase of molarity decreases the grain size which in turn increases the band gap. The scanning electron micrograph and Tunneling electron micrograph of the prepared films reveals the nanocrystalline nature of the prepared films.

MODEL OF MODE LOCKED LASER IN THE GENERATION OF ULTRASHORT PULSES OF FIREFLY

J. Saikia¹, A Gohain Baruah² and G D Baruah

¹Department of Physics, J.B. College, Jorhat, Assam

²Department of Physics, Gauhati University, Assam

Department of Physics, Dibrugarh University, Dibrugarh-786004

Electro-optical physicists have noted an analogy between the in vivo emission of male fireflies and laser light. The spectral distribution of firefly light and the chemistry of firefly have been investigated. In the present work we report a model for generation of Ultrashort-Pulses which is analogous to a mode locked laser in the bioluminescence emission of a firefly.

Keywords : Ultrashort pulses, Bioluminescence, Mode locked laser.

POLYMER- METAL NANO COMPOSITE FOR APPLICATION AS PASSIVE ELECTRONIC COMPONENTS

Rajib Saikia¹, P. Gogoi¹, U.J. Mahanta¹, Pranayee Datta²

¹Dept. of Physics, Sibsagar College, Joysagar, Assam.

²Dept. of Electronics and Communication Technology, Gauhati University, Guwahati, Assam.

Over the last decade, polymer- metal nano composites have drawn a great deal of attention for their extensive application in organic flexible devices. Here, we describe the synthesis and characterization of silver -polyvinyl alcohol (PVA) nano composites and investigate possibility of application of these composites as efficient capacitors. The material characterization is done through UV-VIS absorption SEM and AFM. The dielectric property of the nanocomposite material is investigated with LCR meter. The effects of different fabricating parameters on the electrical and electronic properties of the fabricated composite have also been investigated. The composite material exhibits a high dielectric constant and hence it may be the suitable ingredient for high capacitance capacitor. Works are in progress and results in detail will be presented at the conference

Key Words: Nan composite, Dielectric Constant, high capacitance capacitor.

Oral Presentation -16

LASERS IN OPHTHALMOLOGY: DIAGNOSTIC LASER APPLICATIONS AND LASERS IN RETINAL DISEASES

Abhijit Kr Handique

Dept of Ophthalmology, Assam Medical College

Eye being an highly sensitive, complex, miniature extension of the brain; requires sophisticated methods to diagnose its diseases. Laser based diagnostic tools not only made diagnosis easy, but also has discovered new facts which contributed greatly to applied medicine. Laser interferometry, Confocal scanning laser ophthalmoscopy, Optical coherence tomography, holographic interferometry, laser spectroscopy etc are some revolutionary applications of laser in diagnostic ophthalmology. Over and above the

diagnostic lasers, therapeutic laser application in retinal diseases are established treatment protocol. The principle of Laser photocoagulation and photochemical reactions are utilized in the treatment plan of retinal diseases. The presentation will aim to cover the complex understanding of laser tissue interaction in intelligible format.

Oral Presentation - 17

GENERATION OF EXACT S WAVE SOLUTION SCHRÖDINGER FOR QUANTUM BOUND SYSTEM IN NEW POWER LAW SYSTEM

L.Buragohain¹, S.A.S.Ahmed²

¹Department of Physics, Chaiduar College, Gohpur-784168, India.

²Department of Physics, Gauhati University, Guwahati-781014, India.

A transformation method is discussed to generate a set of new exactly solved quantum systems in any chosen dimensional Euclidean space from a non-powerlaw potential. The exact bound state S wave solution of the Schrödinger equation and associated energy eigen value of a generated quantum system is reported. The normalizability of the generated quantum systems are also given.

Oral Presentation - 18

COMPUTER IN THE INVESTIGATION OF EPITAXY FORMATION IN RENAL STONES

S. Bhattacharyya

Department of Physics, D.C.B. Girls' College, Jorhat-785001

Method of computer tomography (CT scan) is extensively used in medical diagnosis. In the present work we report an investigation of the process of epitaxy in renal stones with the help of the method of computer tomography. In the present work we analyze the process of epitaxy with the help of concentric rings in the renal stones. An estimate of the frequency of formation of the layers in the bladder stones showing epitaxy is also made. A software is used to obtain information about the particle distribution in the form of three dimension intensity.

Key words: Renal stones, epitaxy.

HIGH RESOLUTION SPECTROSCOPY OF N₂O AND HCCCN EMBEDDED IN MICROSCOPIC SUPERFLUID ⁴He STRUCTURES

Samrat Dey^{^*} and Yatendra S. Jain[^]

[^]*Department of Physics, North-Eastern Hill University, Shillong-22.*

^{^*}*Department of Basic Sciences, Donbosco University, Guwahati.*

High resolution spectroscopy of molecules doped in ⁴He nano-droplets and clusters gives a signature of microscopic superfluidity; the rotational spectrum of clusters have sharp peaks (indicating that the molecule rotates like a free rotor) and moment of inertia and vibrational frequency shift have a non-trivial dependence on the number (N) of ⁴He atoms in ⁴HeN-M clusters/nano-droplets. The ro-vibrational spectrum of such a system is studied by using important physical realities, concluded by Macro-Orbital theory (viz., localised and orderly arrangement of ⁴He atoms, although, being free to move in the order of their locations; individual ⁴He atoms cannot be tagged as normal/ superfluid, etc.) and other factors (e.g., consideration that the ⁴He atoms which happen to fall in the plane of rotation of a molecule, render a equipotential ring and thus, do not take part in rotation; etc.) which effect the rotational and vibrational spectrum of the system. This helps us in successfully explaining the experimental findings.

ABSORPTION AND SPATIAL HOLE BURNING IN LASING WITHOUT INVERSION

Rajib Kumar Dubey and Gaurangadhar Baruah

Department of Physics, Dibrugarh University

Dibrugarh - 786001, (India)

gdbaruah@rediffmail.com, dubey10@yahoo.co.in

In Lasing without inversion absorption is cancelled via quantum interference. An analysis of LWI has been made in terms of spatial hole burning and cancellation of absorption in this work. The notion of stimulated decay is introduced for the first time.

BOSE-EINSTEIN CONDENSATION, ATOM LASER AND APPLICATION OF SEMICLASSICAL THEORY OF LASER

H. Konwar, R. Borah¹ and G.D. Baruah

Department of physics, Dibrugarh University, Dibrugarh-786004,

Department of physics, Chaiduar College, Gohpur-784168

There is a host of experiments where Bose-Einstein condensate (BEC) and atom lasers generated from them can make dramatic improvements in the measurements of fundamental constants in physics and we can also expect new horizons to open up. Semi classical theory of laser as developed by Lamb and co-workers has described a large number of laser phenomena. It may be noted that the theory was initially applied in stationary atoms and subsequently for moving atoms. In the present work we apply this theory for stationary atoms in BEC and atom laser. The dispersion curve near threshold is evaluated for BEC using decay parameter appropriate for atom laser.

ON THE NATURE OF THE DISPERSION CURVES IN INVERTED MEDIUM EXHIBITING SUPERLUMINAL EFFECT

Rita Moni Borah¹ S. Baruah¹ and G.D. Baruah²

¹Deptt. Of Physics, Chaiduar College, P.O.-Gohpur-784168, Dist-Sonitpur (Assam)

²Deptt of Physics, Dibrugarh University.

In the present work it has been shown that a medium (inverted) exhibiting superluminal effect possesses highly, asymmetric dispersion of parameter ω_p (Plasma frequency) - 1.50 and decay constant $\gamma = 3.7$ the dispersion curve becomes highly asymmetric and the value of refractive index becomes $n = 0.003$. At this point a Gaussian pulse travels at a speed three hundred times the speed of light (without violation of causality). In the present work we have established a relationship indicating the magnitude of asymmetry and the corresponding decay constants. Our analysis indicates that the relation is the well-known minimum deviation curve.

Key Words: Inverted Medium Superluminal Effect.

Poster Presentation - 4

STUDY OF RAMAN SPECTRA OF P-N- ALKYLOXYBENZOIC ACID

S.J.Gogoi and B.Gogoi

Department of Physics, Tinsukia College, Tinsukia, Assam, India

Raman spectroscopy has been extensively used in the study of liquid crystals to extract spectral information more specifically on the molecular structure and intra/inter - molecular interactions in the liquid crystalline phases. The study of phase transitions of the p-n-heptyloxybenzoic acid (HOBA), p-n-octyloxybenzoic acid (OOBA) and p-n-decyloxybenzoic acid (DOBA) liquid crystals using Laser Raman spectroscopic techniques at the room temperature highlight the changes in peak position towards lower side of HOBA, OOBA and DOBA at crystalline to Smectic C phase transition is an indication of the decrease in the freedom of the individual molecules.

STUDY OF RAMAN SPECTRA ON PHASE TRANSITIONS OF OOBA

B.Gogoi and S.J.Gogoi

Department of Physics, Tinsukia College, Tinsukia, Assam, India

p-n-octyloxybenzoic acid (OOBA), one of the materials of thermodynamically most regular groups of mesophase-forming materials, is studied using Raman spectroscopic technique for the phase transition of crystalline \rightarrow smatic C and Smc \rightarrow nematic as a function of temperature. The Raman spectra depicts that the crystalline to nematic phase transition is marked by definite changes in most of the spectral parameters highlight a first order transition. Also it is found that as the temperature is raised, the Raman bands broaden due to changes in conformation are occurring on the time-scale of a molecular vibration.

GEOMETRICAL REPRESENTATION OF NEAR RESONANT INTERACTION OF RADIATION WITH MATTER

*** R. Bora and G. D. Baruah**

Physics Department, Dibrugarh University, P.O. Dibrugarh, Assam - 786004, India.

** Physics Department, Namrup College, P.O. Parbatpur, Assam - 786623, India.*

In this work we have presented a simple geometrical way of representing the behavior of a two - level atomic system in presence of a near resonant electromagnetic field. This approach is free from hassles of mathematical formulations of equations of motion and their solutions.

Interaction of matter with near resonant radiation field has been studied. Equations of motion for the interacting atomic/ molecular dipoles have been derived and solved using RWA and rotation coordinate transformation technique. One of the solutions indicates to the occurrence of a periodic time variation in the population difference (inversion) of the interacting medium. Here the time evolution of the transition probability (wave function) is being represented by the motion of a pseudo vector R . In this work the presence of various relaxation processes have been ignored as they bear little significance in a system which is being continuously being irradiated

by a near resonant radiation field. The behavior of R is different in resonant and near resonant cases. We take near resonant situation as in a system not free from Doppler broadening it is virtually impossible to get exact resonance.

Key Words: *Optical Nutation, Pseudo vector, Dephasing, Quantum superposition.*

Reference :

1. H. Goldstein, Classical Mechanics, (Narosa Publishing House, New Delhi 1989).
 2. Allen and J.H. Eberly, Optical Resonance and Two Level Atoms. (John Willey & Sons. N-Y, 1975).
 3. I.I. Rabi, Phys. Rev.51, 652(1937).
 4. F. Bloch, Phys. Rev. 70, 460(1946).
- M Sargent, M.O. Scully and W.E. Lamb, Laser Phys. (Addison Wesley Publishing Co. Advanced Book Program Reading, Massachusetts, 1974

Poster Presentation - 7

UPCONVERSION IN Nd³⁺- DOPED TiO₂ FILMS DERIVED AT ROOM TEMPERATURE

P.J. Dihingia and S.Rai

Laser and Spectroscopy Laboratory

Department of Physics, Dibrugarh University, Dibrugarh-786004 (Assam)

Email: dihingia_17n@yahoo.co.in, srai.raai677@gmail.com

Nd³⁺-doped TiO₂ films were synthesized by a sol-gel dip-coating technique at room temperature. The TiO₂ matrix consists of titanium isopropoxide [Ti(i-PrO)₄] dissolved in isopropanol with the addition of acetic acid. Appropriate amount neodymium oxide (Nd₂O₃) dissolved in nitric acid was added to the prepared matrix under continuous stirring to form the final sol. Transparent titania films were deposited on glass substrates by dip-coating in the obtained sol. The films were dried at room temperature, i.e., the gellification was allowed to occur on substrates at normal room temperature. The upconversion spectra of the prepared films were recorded at different excitation wavelengths. Two sharp peaks corresponding to room-temperature upconversion emission at 341 nm and 483 nm were observed for an optimum Nd³⁺ concentration of 0.01M upon excitation with 532 nm.

Also, cyan to green up conversion emissions were noticed for excitation wavelengths ranging from 770 nm to 820 nm.

Poster Presentation - 8

EFFECT OF TEMPERATURE ON THE CHRISTIANSEN EFFECT

Rajib Mahanta

Dibru College, Department of Physics, Dibrugarh-786003

If a suspension of particles in a liquid medium has a refractive index whose rate of change with wavelength is different from that of the liquid and if the refractive indices of particles and liquid are equal at a particular wavelength, then the medium will transmit perfectly at that wavelength. At all other wavelength, scattering will occur. This effect is known as Christiansen effect after its inventor. The present chapter is concerned with the effect of temperature on the chromatic pattern associated with Christiansen effect. A significant fact of observation is that the chromatic pattern changes as temperature changes. It is observed that this chromatic pattern in Christiansen effect has wide potential to use as temperature sensor.

Poster Presentation - 9

IODINE DOPED PENTACENE THIN FILM TRANSISTOR WITH O₂ ANNEALED Nd₂O₃ AND SiO₂ DOUBLE LAYER GATE INSULATOR

R. Sarma*

Thin Film Lab, Department of Physics, J B College, Jorhat, Assam, India

**Email: sarmamax2000@yahoo.com*

In this paper iodine doped pentacene organic thin film transistor with O₂ annealed Nd₂O₃ and SiO₂ double layer gate insulator is presented. The films are prepared by conventional vacuum deposition method. Commercially available pentacene powder (Aldrich 99.9%) is used for deposition without further purification. Gold is used as source, drain and gate electrodes. The five layered active devices with staggered electrode structure are deposited on glass substrate. The iodine doping to the pentacene film is carried out by introducing the iodine vapor into it at a pressure below 10⁻⁵ torr. Compared to pentacene OTFT without iodine doping, the device with iodine doping

exhibits an enhancement of the field effect mobility from $0.08 \times 10^{-4} \text{ m}^2/\text{V.s}$ to $0.13 \times 10^{-4} \text{ m}^2/\text{V.s}$ and decreasing threshold voltage from -1.1V to -1.3V . XRD patterns of pentacene film before and after the doping are also presented.

PACS Nos.: 72.80.Le, 72.20Jv, 73.61.Ng, 73.40.Qv

Poster Presentation - 10

DESIGN CONSIDERATIONS OF A θ, φ - DEPENDENT LASER SCATTERING SET UP FOR MONITORING SMALL PARTICLES

Sanchita Roy* and Gazi Ameen Ahmed

*Optoelectronics and Photonics Laboratory, Department of Physics,
School of Science and Technology, Tezpur University*

Tezpur-784028, Assam, India

**Email : rsanchita1@gmail.com*

A novel designed consideration of a θ, φ -dependent detector was incorporated into the existing θ -dependent light scattering setup for monitoring spherical and non-spherical particles. The introduction of the φ -dependent detector arrangement gave a particularly high accuracy in the measurement of non-spherical particles. This paper reports the optical investigation and analysis of sub-micron sized particles using a designed and fabricated laser based light scattering system that uses a photomultiplier tube (H 5784-20) which can be operated at three different wavelengths of 543.5 nm, 594.5 nm and 632.8 nm. These three incident wavelengths of light were used alternately. Light scattering readings were taken from an angle of 10° to 160° in steps of 5° for polar angle θ and from 10° to 50° for azimuthal angle φ . An attempt was made to experimentally determine the most significant elements of the Mueller scattering matrix. Mie theory was extended to interpret the measurement from particles under investigation. The accuracy and the reliability of our setup were verified by conducting measurements on the light scattering properties of polystyrene spheres and comparing the results with theoretical Mie calculations. The results from the experiments have been found to tally well with our theoretical expectation.

AMPLIFICATION AND GAIN NARROWING IN COMBINATION OF PPV

Ranjan Changmai¹ and G.D. Baruah

¹*Department of Physics, D.H.S.K.College, Dibrugarh-786001*

Department of Physics, Dibrugarh University, Dibrugarh

Email:ranjan_changmai@rediffmail.com

Conjugated polymers have emerged in recent years as attractive gain medium for lasers and optical amplifiers. Spectral narrowing of the spontaneous emission and stimulated emission from semi conducting and π conjugated polymers have been observed in numerous cases. Conjugated polymers can emit light as neat solid films and in addition, are capable of charge transport, thereby providing the potential to make electrically pumped laser. The threshold condition of oscillation and amplified spontaneous emission (ASE) for semi conducting polymers have been worked out with the help of wave analysis. In the present work we reports spectral narrowing in a combination of PPV. The phenomenon is explained on the basis of energy transfer mechanism operating between the exciting radiations and the fluorescence system

Poster Presentation - 12

LASER-INDUCED FLUORESCENCE OF JUICE AND SKIN OF RAW AND RIPE LEMONS (CITRUS LIMON)

P. R. Borthakur¹ and A. Gohain Barua²

¹*Department of Physics, Icfai University Tripura, Agartala -799210, Tripura*

²*Department of Physics, Gauhati University, Guwahati-781014, Assam*

The oval type lemon fruit is used mainly in cooking and baking. Lemon juice enhances the taste of many a dish and lemon-flavored drinks is a popular warm-weather beverage. It is also eaten raw, used in making juices, desserts, and for flavoring. Lemon byproducts are used in beverages, candies, fruit jellies and furniture oil. Here we use a diode laser of wavelength 405 nm to excite fluorescence from raw and ripe lemon (*Citrus Limon*) juice and skin, dissolved in acetone. Emission peaks of the juice are observed at 524, 540 (shoulder) and 672 nm in all the stages. The peak at 672 nm raises curiosity,

as chlorophyll fluorescence is observed at this wavelength. The emission peaks of the skin for both the stages are observed at two different wavelengths 520 and 672 nm. Intensities of the peaks change noticeably when the fruit becomes ripe. Ratios of the intensities of the peaks of the juice in the raw stage are $I_3/I_1 = 0.667$, $I_3/I_2 = 0.704$, $I_2/I_1 = 0.947$ and in the ripe stage are $I_3/I_1 = 0.40$, $I_3/I_2 = 0.427$, $I_2/I_1 = 0.935$. Ratios of the intensities of the peaks of skin in raw stage is $I'_1/I'_2 = 0.787$ and in the ripe stage is $I'_1/I'_2 = 0.4038$. We propose that the differences in ratios of I_1/I_3 , I_1/I_2 and I'_1/I'_2 could be taken as indicators of ripening of lemons.

Poster Presentation - 13

OPTICAL CHARACTERISATION OF VACUUM DEPOSITED ZnSe THIN FILM

P. Saikia and P. K. Saikia

Thin film laboratory

Department of Physics, Dibrugarh University, Dibrugarh-786004

E-mail: psaikia123@gmail.com

Vacuum evaporated ZnSe thin films were deposited on clean glass substrates maintaining substrate temperature at 383 K. deposited films were characterised by XRD, transmission, absorption and photoluminescence spectra. The XRD spectra revealed that films were polycrystalline nature having f.c.c. zincblende structure with preferred orientation along [111] direction. The photoluminescence spectra of the film showed blue, green and red emission. ZnSe films grown by vacuum evaporation method is a promising material for the fabrication of semiconductor-based opto-electronic devices.

Keywords: ZnSe, Absorption spectra, Photoluminescence spectra.

SUPERCONDUCTING PROPERTIES OF $\text{Er}_2\text{BaCuO}_{5+x}$ THIN FILMS

P.C. Kalita¹ and B. Baishya²

¹*Deptt. of Electronics, Sibsagar College, Joysagar, Sivasagar-785665 (Assam)*

²*Deptt. of Physics, Dibrugarh University, Dibrugarh-786004 (Assam)*

E-mail: drpckalita@gmail.com

$\text{Er}_2\text{BaCuO}_{5+x}$ superconducting compound was prepared by solid-solid reaction method by taking the constituent components in their stoichiometric ratios and heating the mixture at 1050°C for 24 hours. The XRD pattern of the resulting powdered sample confirmed the above phase. Films were deposited by vacuum evaporation technique. The I-V characteristics of the films were obtained at 303 K and 273 K. The variation of resistivity with temperatures ranging from 77 K to 403 K was also reported. A large variation of resistivity was noticed at 85 K, which indicated the formation of superconducting phase.

A SATELLITE BASED STUDY ON THE BEHAVIOR OF TROPOSPHERIC COLUMN OZONE AND ITS PRECURSORS OVER DIBRUGARH

Gayatry Kalita, Binita Pathak, Kalyan Bhuyan and Pradip K. Bhuyan

Centre for Atmospheric Studies, Dibrugarh University, Dibrugarh

Tropospheric O_3 is a direct greenhouse gas and it is a precursor for highly reactive hydroxyl radical, which determines the lifetime of many trace gases in the troposphere. The main sources of ozone precursors are vehicular traffic and biomass burning, which significantly emit the oxides of nitrogen and CO. In the absence of all tropical NO_x sources, an O_3 background of 28% remains, reflecting transport and chemical production from extra tropical sources. The sum of O_3 produced from all NO_x sources, stratosphere-troposphere exchange and the O_3 background explains only 90% of the ozone burden because of ozone production nonlinearity. Ozone measurements from the Ozone Monitoring Instrument (OMI) and Microwave Limb Sounding (MLS) instruments on board the Aura satellite are used for deriving distributions

of tropospheric column ozone (TCO) over Dibrugarh. In this study we assess the processes controlling tropospheric column ozone burden with particular attention in its precursors. The tropospheric column NO_2 is retrieved from Ozone Monitoring Instrument (OMI) on board the Aura satellite and Column CO is retrieved from Measurement of Pollution in the Troposphere (MOPITT) flying on NASA's EOS Terra spacecraft. A substantial decreasing trend of TCO over Dibrugarh is been clearly in sighted. The seasonal variation shows maximum in summer months (April, May) and minimum in late monsoon or post monsoon (July, August, September) months. The maximum value of tropospheric column over Dibrugarh is observed to be 47 DU, which is an average value for a semi urban location. In our study the overall ozone in a year seems to be decreasing with the slope -0.10551. The trend of tropospheric column NO_2 over Dibrugarh estimated for the same period, which resembles with the TCO trend. The seasonal cycle of tropospheric column NO_2 shows maximum in summer (April) and minimum in post monsoon months (September-November). The decreasing trend of NO_2 is an evidence of active chemical reactions which leads to loss of NO_2 through different way. However the similar results as in tropospheric ozone reveal the positive correlation between NO_2 and O_3 . The maximum value of tropospheric column NO_2 is observed in April 2009 where it has reached 1.94×10^{15} molecules/cm². As expected the behavior of column CO over Dibrugarh also shows decreasing trend in last three years. The seasonal maxima and minima observed in summer and post monsoon months respectively. The positive correlation between CO and O_3 (~0.46), and significantly better between NO_2 and O_3 (~0.58) is as expected. The column CO values over Dibrugarh shows low concentration with maximum value in March 2009 (3.41×10^{18} molecules/cm²) and minimum in July (1.67×10^{18} molecules/cm²). The minimal decreasing trend in tropospheric ozone and its precursors over Dibrugarh reveals comparatively stable anthropogenic emissions to the atmosphere than that of in other urban areas.

ROLE OF ISOTOPE SCATTERING ON ANHARMONIC INTERACTION

Banashree Saikia

Lecturer, Dept of Physics, Jorhat Engineering College

We adopt Klemen's theory to show the effects of localized mode due to defects which can interchange energy with the phonons by anharmonic interactions. It is observed that anharmonic interaction is not very strong to destroy the character of the localized mode at the defect. Also, the deviation at the thermal conductivity maximum is explained by the dependence of the anharmonic processes on the concentration of the isotopes and the simultaneous presence of impurity atoms and anharmonic interactions.

Keywords: Lattice thermal conductivity, anharmonic processes, localized mode, isotope scattering.

PACS Nos: 63.20Kr; 63.20Ry

FLUORESCENCE AND ABSORPTION SPECTRA OF CHLOROPHYLL EXTRACT OF SOME PLANT LEAVES AND A PENDULUM ANALOGY

Mitali Konwar

Department of Physics, Moran College, Moran, Sibsagarh-785670, India

Email: mitalikonwar@rediffmail.com

In the present work we report the fluorescence and absorption spectra of chlorophyll extracts of some medicinal plant leaves. Based on experimental facts we present a pendulum analogy to account for the oscillating nature of the chlorophyll bands.

ENERGY TRANSFER PROCESS IN LIF OF POLYMER IN A BLEND OF CONJUGATED POLYMERS

Ranjan Changmai¹, Uttam Mohan² and G.D.Baruah

¹Department of Physics, DHSK College, Dibrugarh

²Department of Chemistry, DHSK College, Dibrugarh

Department of Chemistry, Dibrugarh , Dibrugarh

The present work reports the LIF of few-conjugated polymer. The sample of polymers is excited with the help of 25mw solid-state green diode laser and fluorescence system in which lie in the region of wave length of 5800-6350Å are recorded photographically on a glass spectrograph. The energy transfer process is investigated on the basis of the intensity alteration of the fluorescence system.

LASER SCANNING CONFOCAL MICROSCOPY: ULTRAMODERN IMAGING SYSTEM FOR RESEARCH IN LIFE SCIENCES

Aradhana Priyambada Bhuyan, Nirmali Bhuyan

D. H. S. Kanoi College, Dibrugarh.

Laser scanning confocal microscopy has become an invaluable tool for a wide range of investigations in numerous life science disciplines, from cell biology and genetics to microbiology and developmental biology, for imaging thin optical sections in living and fixed specimens ranging in thickness up to 100 micrometers.. Modern instruments are equipped with 3-5 laser systems controlled by high-speed acousto-optic tunable filters (AOTFs), which allow

very precise regulation of wavelength and excitation intensity. Coupled with photomultipliers that have high quantum efficiency in the near-ultraviolet, visible and near-infrared spectral regions, these microscopes are capable of examining fluorescence emission ranging from 400 to 750 nanometers. Instruments equipped with spectral imaging detection systems further refine the technique by enabling the examination and resolution of fluorophores with overlapping spectra as well as providing the ability to compensate for autofluorescence. Recent advances in fluorophore design have led to improved synthetic and naturally occurring molecular probes, including fluorescent proteins and quantum dots, which exhibit a high level of photostability and target specificity. Now in living cells, with the help of organelle probes, LSCM is useful for investigating cellular transport, respiration, mitosis, apoptosis, protein degradation, acidic compartments and membrane phenomena.

Keywords: laser, confocal, acousto-optic tunable filter, photomultipliers, fluorophores.

Poster Presentation - 33

ESTIMATION OF CAPSAICIN OF NINE CULTIVARS OF CHILLIES (*CAPSICUM ANNUM L*)

Alkananda Baruah and P.K. Baruah

Department of Botany, DHSK College, Dibrugarh, Assam

Department of Botany, Dibrugarh University, Dibrugarh

Amount of capsicum, a protoalkaloid, which is responsible for pungency of chillies, have been determined by the spectrophotometric method. The principles of the method lie in the fact that, the phenolic group in capsaicin reduces phosphomolybdic acid to lower of molybdenum. The resulting component is blue in colour and is read at 650nm. the colour intensity is directly proportional to the concentration of capsaicin. Quality of capsicum fruits depends upon the capsaicin content which is determined the pungency of the chillies.

Key Word: Capsicum annum L, Capsaicin, Spectrophotometry

**STUDY ABOUT PRODUCTION OF MUGA
(ANTHERIA ASSAMA) ON CHANGE OF TEMPERATURE,
HUMIDITY AND RAINFALL IN NORTH LAKHIMPUR**

Laba Krishna Rajkhowa and Subhra Utpal Pachani

Tathagat Basic research Center

Trust, North Lakhimpur, Assam. Ph-9954391242

Muga culture, an ecofriendly cultivation is mostly an off time earning of livelihood for Assamese farmers and weavers. Day by day the price of muga is becoming high. One of the cause of hike of the price is due to decrease of production of raw materials i.e., muga cocoon. In view of these we study the temperature, humidity and rainfall of North Lakhimpur and also the production of muga cocoon. A comparative study has been taken in two main season of production i.e. , May-June (Jethuwa) and October-November (Kotia). These studies show nature of production of muga cocoon on change of physical environment.

Professor G.D. Baruah President of the Society for Laser and Optical Science and also the President of the physical section of 85th Indian Science Congress has guided a large number of Ph.D and M.Phil students in the field of Molecular Spectroscopy, Laser Physics and Quantum Optics. The list given below :-

| Sl. No. | Name | Title of the Ph. D. Thesis | Year of Publication of Result | Subject |
|---------|-----------------------|--|-------------------------------|----------------|
| 1. | Dr. R. K. Baruah | Spectroscopic investigation of Bioluminescence. | 1984 | Mol. Spectrum |
| 2. | Dr. D. Phukan | An account of the geology of the area around Sohraium and Laitryngew, Khasi hill, Meghalaya with special emphasis on Physicochemical properties of coal and clay | 1986 | - do - |
| 3. | Dr. L. C. Borah | Spectroscopic investigation of some biologically important substances. | 1991 | - do - |
| 4. | Dr. B. N. Saikia | Properties of Laser beam through atmosphere. | 1991 | Laser Physics |
| 5. | Dr. (Mrs) Prity Borah | Studies of few glass laser systems using classical and semiclassical theory of laser. | 1994 | Quantum Optics |
| 6. | Dr. R. Tamuli | Acomparative study of laser near threshold and matter near phase transition. | 1994 | Quantum Optics |
| 7. | Dr. A Gohain Barua | Propagation of laser beam through disturbed environment. | 1996 | Laser Physics |
| 8. | Dr. N. Baruah | Propagation of high energy laser beam through turbulent atmosphere. | 1996 | Laser Physics |
| 9. | Dr. R. K. Debnath | Spectroscopic investigation of gallstones. | 1996 | Mol. spectrum |
| 10. | Dr. M. Goswami | Investigation of coherent X-ray (X-ray laser) Production. | 1997 | Laser Physics |
| 11. | Dr. A. K. Neog | Investigation of some silicate minerals with special emphasis on 10um -20um ban of infrared spectra and on other physical properties. | 1998 | Mol. spectrum |
| 12. | Dr. U. Mc. Farlane | X-ray diffraction and spectroscopic investigation of polymers. | 1998 | Mol. spectrum |

parameters are calculated by using UV-Vis spectrophotometer. High frequency shift in polar solvents indicates higher polarity of the complex in the ground state. Mc Rae equation is used to describe the specific interaction between the solvent and the charge transfer complex quantitatively and is found to be valid in case of binary mixture solvents with chloroform as one of the components. Oscillator strength and polarizability function are found to vary linearly with each other. Moreover the thermodynamic parameters calculated describe the stability of the complexes. Besides the fluorescence spectra of similar compound is also recorded to study its behaviour in solution. NMR spectra of the complexes under study are recorded to predict their structure. Results obtained verify the difference in strength of charge transfer bonds of I_2 with the two donors, π -picoline and 2-chloropyridine.

Key Words: Charge transfer complexes, oscillator strength, polarizability function

Poster Presentation - 25

AN INFRARED SPECTRAL STUDIES OF CLAY SAMPLES OBTAINED FROM JORHAT AND TINSUKIA DISTRICTS OF ASSAM, INDIA

Ruby Baruah and Purbajyoti Gogoi
Margherita College, Margherita

The clay samples are separated from the alluvial subsurface soils collected from certain places of Jorhat and Tinsukia districts of Assam. The IR spectra of the clay samples were obtained as KBr pellet. The majority of the clay samples show a medium band near 915 cm^{-1} which is a common band for both halloysite and kaolinite. The IR spectral studies show that the clay samples are halloysite and rarely kaolinite. Though X-ray diffraction analysis is more informative than other analysis, IR spectral analysis also provides much information in characterizing clay minerals.

NANOCRYSTALLINE ZnS THIN FILMS BY CHEMICAL METHOD AND ITS CHARACTERIZATION

Bijoy Barman^a, P.K. Mochahari^b, K.C.Sarma^c

^aDepartment of Physics, Abhayapuri College, Abhayapuri.

^bDepartment of Physics, D. K. College, Dergaon.

^cDepartment of Instrumentation and USIC, Guahati University, Guwahati, India

Email: bb_guphys@rediffmail.com

The II-VI compound semiconductors are of great importance due to their application in various electro-optic devices. Several methods have been used to prepare ZnS thin films. We have deposited ZnS films on properly clean glass substrate by chemical method's having wide band gap of 3.50-3.70 eV is a promising material to be used in photovoltaic devices, solar cells. The optical, structural properties of ZnS thin films have been examined. The optical band gap of these films is studied by absorption spectra in wavelength range 300-600nm. The optical band gap show strong blue shift, which is an indication of strong quantum confinement. The Cubic Zinc blend structure of ZnS films is confirmed by X-ray diffraction analysis. The results of the present investigation will be useful in characterizing the material ZnS for its applications in photovoltaic and electro luminescence devices,

Keywords: ZnS thin film, band gap, quantum confinement, Cubic Zinc blend.

COMPOSITIONAL AND OPTICAL CHARACTERIZATION OF CHEMICALLY SYNTHESISED CdS NANOSTRUCTURED THIN FILM

Prince Kumar Mochahari^{1*}, Bijoy Barman², K.C. Sarma³

¹D.K.D. College, Dergaon, Assam

²Abhayapuri College, Abhayapuri, Assam

³Department of Instrumentation & USIC, Gauhati University

E-mail: mocharip@rediffmail.com

Nanostructured CdS Thin Films have been successfully prepared by chemical reaction of Cadmium Chloride and Sodium Sulphide in the PVA

matrix at room temperature and normal laboratory conditions. The obtained particles are characterized using XRF (X- Ray Fluorescence), scanning electron microscopy (SEM), and UV- spectrophotometer. The XRF study shows the elements present in the film prepared, the SEM micrograph shows the morphological structure and the optical study with the help of UV Spectrophotometer indicates that there is blue shift of energy with respect to the bulk material.

Keywords: XRF, SEM, UV-Spectrophotometer, Blue Shift.

Poster Presentation - 28

PROPERTIES AND GENERATION OF NON-CLASSICAL LIGHT

D.K. Hatibaruah and N. Buragohain

Department of Physics, Dhakuakhana College, Lakhimpur, Assam

Coherence is the basic property which gives the distinction between laser light and classical light. Coherent state of radiation field yields minimum uncertainty product close to classical behaviour, whereas squeezing of radiation field is purely a quantum phenomenon. Which has no classical analogue. Squeezed states of light have phase dependent quantum fluctuations. Method of four-wave mixing in a non-linear medium is an important way for the generation of squeezed light. Squeezed coherent radiation can be generated by coherently combining the output beam of a four-wave mixing medium via a 50% - 50% beam splitter.

Keywords : Coherence, squeezing, four-wave mixing, quadratures, non-classicality.

AEROSOL PARTICLES SIZE DISTRIBUTION USING AN OPTICAL TECHNIQUE OF MOVING FRINGES WITH GREEN LASER

Chandan Siam¹ and G.D. Baruah²

¹Physics Department, Digboi College, Digboi, Assam, India

²Physics Department, Dibrugarh University, Dibrugarh, Assam, India.

Email: chandan162@rediffmail.com

The present work is related to the particle sizes of the aerosols above the oil town of Digboi(27.33N, 95.40E). The oil town is usually polluted due to various environmental factors and it is found to be covered with thick cloud of fog in the morning almost throughout the year. A simple technique has been developed to work out the nature of the aerosols with the help of 30mW green laser and computer software.

FT-IR SPECTROSCOPIC STUDY OF CARBOXYL GROUP AND AROMATICITY OF TIRAP (0-8' SEAM) COAL

A Gogoi^a, O P Sahu¹, R K Boruah¹, B K Sarma¹ & A K Hazarika¹

¹North East Institute of Science and Technology, Jorhat-7850 06, Assam

¹Department of Physics, Gauhati University, Guwahati-7810 14, Assam

^aAddress for correspondence: gogoiaimoni@yahoo.com

Coal sample collected from Tirap colliery of Assam was analyzed by using FT-IR Spectroscopic method A selected zone ranging from 1800-1500 cm^{-1} of the FT-IR spectra was deconvoluted and the presence of bands at 1734.1, 1700.9, 1683.1 and 1506.5 cm^{-1} indicate the presence of esters, COOH, C=O and aromatic C=C group. The apparent aromaticity, the aliphatic and aromatic hydrogen content of the coal were found to be 0.79, 0.71 and 7.52 respectively. CHN analysis shows % of C content 72.27, H content 5.50, N content 1.40 and O content 20.83.

Keywords: FT-IR, Coal, Aromaticity

ENERGY TRANSFER PROCESS IN LIF OF POLYMER IN A BLEND OF CONJUGATED POLYMERS

Ranjan Changmai¹, Uttam Mohan² and G.D.Baruah

¹Department of Physics, DHSK College, Dibrugarh

²Department of Chemistry, DHSK College, Dibrugarh

Department of Chemistry, Dibrugarh , Dibrugarh

The present work reports the LIF of few-conjugated polymer. The sample of polymers is excited with the help of 25mw solid-state green diode laser and fluorescence system in which lie in the region of wave length of 5800-6350Å are recorded photographically on a glass spectrograph. The energy transfer process is investigated on the basis of the intensity alteration of the fluorescence system.

LASER SCANNING CONFOCAL MICROSCOPY: ULTRAMODERN IMAGING SYSTEM FOR RESEARCH IN LIFE SCIENCES

Aradhana Priyambada Bhuyan, Nirmali Bhuyan

D. H. S. Kanoi College, Dibrugarh.

Laser scanning confocal microscopy has become an invaluable tool for a wide range of investigations in numerous life science disciplines, from cell biology and genetics to microbiology and developmental biology, for imaging thin optical sections in living and fixed specimens ranging in thickness up to 100 micrometers.. Modern instruments are equipped with 3-5 laser systems controlled by high-speed acousto-optic tunable filters (AOTFs), which allow

very precise regulation of wavelength and excitation intensity. Coupled with photomultipliers that have high quantum efficiency in the near-ultraviolet, visible and near-infrared spectral regions, these microscopes are capable of examining fluorescence emission ranging from 400 to 750 nanometers. Instruments equipped with spectral imaging detection systems further refine the technique by enabling the examination and resolution of fluorophores with overlapping spectra as well as providing the ability to compensate for autofluorescence. Recent advances in fluorophore design have led to improved synthetic and naturally occurring molecular probes, including fluorescent proteins and quantum dots, which exhibit a high level of photostability and target specificity. Now in living cells, with the help of organelle probes, LSCM is useful for investigating cellular transport, respiration, mitosis, apoptosis, protein degradation, acidic compartments and membrane phenomena.

Keywords: laser, confocal, acousto-optic tunable filter, photomultipliers, fluorophores.

Poster Presentation - 33

ESTIMATION OF CAPSAICIN OF NINE CULTIVARS OF CHILLIES (*CAPSICUM ANNUUM L*)

Alkananda Baruah and P.K. Baruah

Department of Botany, DHSK College, Dibrugarh, Assam

Department of Botany, Dibrugarh University, Dibrugarh

Amount of capsicum, a protoalkaloid, which is responsible for pungency of chilies, have been determined by the spectrophotometric method. The principles of the method lie in the fact that, the phenolic group in capsaicin reduces phosphomolybdic acid to lower of molybdenum. The resulting component is blue in colour and is read at 650nm. the colour intensity is directly proportional to the concentration of capsaicin. Quality of capsicum fruits depends upon the capsaicin content which is determined the pungency of the chilies.

Key Word: Capsicum annum L, Capsaicin, Spectrophotometry

**STUDY ABOUT PRODUCTION OF MUGA
(ANTHERIA ASSAMA) ON CHANGE OF TEMPERATURE,
HUMIDITY AND RAINFALL IN NORTH LAKHIMPUR**

Laba Krishna Rajkhowa and Subhra Utpal Pachani

Tathagat Basic research Center

Trust, North Lakhimpur, Assam. Ph-9954391242

Muga culture, an ecofriendly cultivation is mostly an off time earning of livelyhood for Assamese farmers and weavers. Day by day the price of muga is becoming high. One of the cause of hike of the price is due to decrease of production of raw materials i.e., muga cocoon. In view of these we study the temperature, humidity and rainfall of North Lakhimpur and also the production of muga cocoon. A comparative study has been taken in two main season of production i.e. , May-June (Jethuwa) and October-November (Kotia). These studies show nature of production of muga cocoon on change of physical environment.

Professor G.D. Baruah President of the Society for Laser and Optical Science and also the President of the physical section of 85th Indian Science Congress has guided a large number of Ph.D and M.Phil students in the field of Molecular Spectroscopy, Laser Physics and Quantum Optics. The list given below :-

| Sl. No. | Name | Title of the Ph. D. Thesis | Year of Publication of Result | Subject |
|---------|-----------------------|--|-------------------------------|----------------|
| 1. | Dr. R. K. Baruah | Spectroscopic investigation of Bioluminescence. | 1984 | Mol. Spectrum |
| 2. | Dr. D. Phukan | An account of the geology of the area around Sohraium and Laitryngew, Khasi hill, Meghalaya with special emphasis on Physicochemical properties of coal and clay | 1986 | - do - |
| 3. | Dr. L .C. Borah | Spectroscopic investigation of some biologically important substances. | 1991 | - do - |
| 4. | Dr. B. N. Saikia | Properties of Laser beam through atmosphere. | 1991 | Laser Physics |
| 5. | Dr. (Mrs) Prity Borah | Studies of few glass laser systems using classical and semiclassical theory of laser. | 1994 | Quantum Optics |
| 6. | Dr. R. Tamuli | Acomparative study of laser near threshold and matter near phase transition. | 1994 | Quantum Optics |
| 7. | Dr. A Gohain Barua | Propagation of laser beam through disturbed environment. | 1996 | Laser Physics |
| 8. | Dr. N. Baruah | Propagation of high energy laser beam through turbulent atmosphere. | 1996 | Laser Physics |
| 9. | Dr. R. K. Debnath | Spectroscopic investigation of gallstones. | 1996 | Mol. spectrum |
| 10. | Dr. M. Goswami | Investigation of coherent X-ray (X-ray laser) Production. | 1997 | Laser Physics |
| 11. | Dr. A. K. Neog | Investigation of some silicate minerals with special emphasis on 10um -20um ban of infrared spectra and on other physical properties. | 1998 | Mol. spectrum |
| 12. | Dr. U. Mc. Farlane | X-ray diffraction and spectroscopic investigation of polymers. | 1998 | Mol. spectrum |

| | | | | |
|-----|--------------------------|---|------|----------------|
| 13. | Dr. M. Gogoi | Application of semiclassical theory laser to ring laser. | 1999 | Laser Physics |
| 14. | Dr. L. Khanikar | Investigation of some X-ray laser system. | 2001 | Laser Physics |
| 15. | Dr. Jiban Saikia | Ring laser configuration and model of optical fiber ring laser for generation ultrashort pulses. | 2003 | Quantum Optics |
| 16 | Dr. Devika Phukan | Some analysis of the classical and quantum theories of stimulated Raman Scattering and application in fiber optics. | 2003 | Laser Physics |
| 17 | Dr. Ritamoni Borah | Application of semiclassical and quantum theory to some gas and quantum well laser system. | 2003 | Quantum Optics |
| 18. | Dr. Sutapa Bhattacharyya | Spectroscopic investigation of some pigment gallstones and biological molecules. | 2004 | Mol. Spectrum |
| 19. | Dr. Dilip Kr. Neog | X-ray laser calculation for Inversion in isoelectric isoelectric Sequences. | 2005 | Laser Physics |
| 20. | Dr. Ranjan Changmai | Optical, Spectroscopic properties and Energy transfer mechanism in some Glasses and Laser materials. | 2006 | Laser Physics |
| 21 | Dr. Tulika Tamuli | Investigation of quantum beat lasers and laser | 2006 | Quantum Optics |
| 22. | Dr. Mitali Konwer | Optical and spectroscopic studies of some medicinal plant and natural dyes. | 2007 | Mol. Spectrum |
| 23. | Dr. Rajib Bordoloi | A study of laser induced change in threshold behaviour and other Nonlinear Transient phenomena in Molecular Media. | 2008 | Quantum Optics |
| 24. | Dr. Rajib Mahanta | Spectroscopic and Optical studies of Christiansen effect in various phases. | 2008 | Optics |
| 25. | Dr. Rajib Konwar | Optical and spectroscopic studies of some stratified media. | 2009 | Mol. Spectrum |

| | | | | |
|-----|---------------------|---|------|----------------|
| 26 | Dr. Nayanjyoti | Optical and spectroscopic studies of lightning and other natural phenomena. | 2010 | Mol. spectrum |
| 27. | R. K. Dube | Investigation on V and Δ Schemes of Lasing without inversion. | -- | Quantum Optics |
| 28. | Farzana B. Hazarika | Investigation on some quantum interference laser system | -- | Quantum Optics |
| 29. | Himanta Konwar | Investigation on Quantum theory of Optical Coference and Atom Laser | -- | Quantum Optics |

The Following students received M. Phil degree Under supervision of Dr. G. D. Baruah

| Sl. No. | Name | Title of the Ph. D. Thesis | Year of award | Subject |
|---------|-------------------------------|--|---------------|----------------|
| 1. | Mr. D. Deb | On the nature of the error curve of Hartman Dispersion formula using and ASCO Comparator | 1985 | Mol. Spectros |
| 2. | Ms. A. Das | Investigation on current voltage characteristics of CO discharge in the presence of Benzene. | 1985 | Spectros Copy |
| 3. | Mr. D. Neog | A review of the production of coherent radiation in very short wavelength region. | 1988-89 | Laser Physics |
| 4. | Ms. Monorama Borah | Novel properties of Laser and its applications. | 1989 | Laser Physics |
| 5. | Dr. P. Borah | Classical theory of Laser. | 1989-90 | Laser Physics |
| 6. | Rekah Sarmah Baruah | A review of some optically pumping scheme of extremely short wavelength | 1990 | Laser Physics |
| 7. | Dr. R. Konwar | A review of some of the theoretical aspects in semiclassical laser theory. | 1990 | Laser Physics |
| 8. | Mr. L. Dutta | A comparative study on laser near threshold matter near phase transition. | 1991 | Laser Physics |
| 9. | Mr. I. V. Goswami | A spectroscopic investigation of some biological substances. | 1994 | spectros Copy |
| 10. | Dr. M. Gogoi | Application semiclassical theory of Ring laser. | 1995 | Quantum Optics |
| 11. | Dr. J. Saikia | A review of variation Non-linear susceptibility of some organic materials. | 1996 | Quantum Optics |
| 12. | Dr. Devika Phukan | Some analysis of Classical and Quantum theory of Stimulated Raman Scattering | 1998 | Laser Physics |
| 13. | Mr. S. Kakoti | Laser Photon Statistics | 1999 | Laser Physics |
| 14. | Mr. Priyangshu Rana Borthakur | Some analysis in Ring laser Configuration | 1999 | Laser Physics |

| | | | | |
|-----|-----------------------|---|------|-----------------|
| 15. | Ms. Triveni Saikia | A comparative study between Semiclassical and Quantum theory of Laser | 2000 | Laser Physics |
| 16 | Dr. Ranjan. Changmai | Properties of coherent and squeezed state of light. | 2000 | Laser Physics |
| 17 | Mr. D. K. Hatibaruah | The properties of coherent state. | 2002 | Quantum Optics |
| 18 | Mr. Pranjal P. Saikia | X-ray laser | 2009 | Laser Physics |
| 19. | Ms. Kabita Deka | Quantum theory of Laser | 2009 | Quantum Optics |
| 20. | Hemanta Konwar | Quantum Theory of Optical coherent | 2010 | Quantum Optics |
| 21. | Bijit Borah | Raman Laser | 2009 | Laser Physics |
| 22. | Madhujya Gogoi | Exculation of X-ray Laser inversion | 2008 | Laser Physics |
| 23. | Gayatri Das | Investigation on teno effect and its relation with Quantum interference Laser | 2008 | Quantum Optics |
| 24. | Jagat Ch. Gogoi | Semiconducting polymers and polymer laser | 2009 | Laser Physics |
| 25. | Ranjana (Bora) | Vector model of desity matrick and its application in laser | 2007 | Quantum Optics |
| 26. | Dhrubajyoti Sarmah | Application of density matrick formalism | 2008 | Quantum Optics |
| 27. | Masum Das | Bose-Einstein condensate, atom laser and application of semiclassical theory | 2008 | Laser Physics |
| 28. | Arup Saikia | Effect of Quantum coherence in atomic transition | 2008 | Quantum Optics. |

GYAN VIGYAN ACADEMY DIBRUGARH

A JUNIOR COLLEGE SCIENCE | ARTS | COMMERCE

Our Features :-

- ❖ Options for Parallel Coaching for IIT-JEE / AIEEE / PMT aspirants

Conducted by

CAREER POINT, KOTA

- ❖ Experienced & Dedicated Teachers.
- ❖ Regular Doubt Clearing Session.



- ❖ Individual Monitoring Session.
- ❖ Well-equipped Laboratory
- ❖ Guest Lecturers from Reputed Institutions, Universities of India & abroad.

2ND BATCH PERFORMANCE : Pass Rate : 100%
Star holder -13, First Div. - 91, Second Div. - 32,
Total Appeared : 123

Best Performer: Suman Sarma (3 Marks less for Ranking), Subhangkar Das (421), Debashree Karmakar (407), Semina Nasreen Ahmed (405), Sanjeeb Bora (396)



CAREER POINT, KOTA
Total Learning Solution Provider



| IIT - JEE DIVISION | AIEEE DIVISION | MEDICAL DIVISION |
|--|--|--|
| FOUNDATION COURSE (XI Board + IIT-JEE) | FOUNDATION COURSE (XI Board + AIEEE) | FOUNDATION COURSE (XI Board + AIPMT) |
| FRESHER COURSE (XII Board + IIT-JEE) | FRESHER COURSE (XII Board + AIEEE) | FRESHER COURSE (XII Board + AIPMT) |
| TARGET COURSE (IIT-JEE) For class XII passed student | TARGET COURSE (AIEEE) For class XII passed student | TARGET COURSE (AIPMT) For class XII passed student |

Contact :-

DIBRUGARH CENTRE,

PH : (0373)2329001 / 9435390973 / 9864579618

Head Office : CP Tower, IPIA, Road No.1, Kota, Rajasthan www.careerpointgroup.com

With Best Compliments from :



Pride The
SILKALAY

প্ৰাইড দা
চিল্কালয়

**The Mega Showroom of Assam Silk
Mekhala Chaddar & Saree**

**K. C. Gogoi Path, Khalihamari (Near SBI), Dibrugarh
Phone : 9207041558**

With Best Compliments from :



B. Agarwalla

Dibrugarh (Assam)

BRAHMAPUTRA DIAGNOSTICS & HOSPITAL LTD.

A Most Modern Multi Speciality Hospital in Upper Assam
Paltan Bazar, Dibrugarh PH. (0373) 2303476, 2303477
2303478 Fax (0373) 2302680

Complete & 24 Hours
Functioning
Digital Video Endoscopic
UROLOGY Department

Facilities Available in this Hospital

Diagnostics Division :

» Multi Slice 3 dimension C.T. Scan with Cardiac Imaging, » Video Endoscopy
» Computerized X-Ray with IITV, » Computerized Mobile C-Arm X-Ray, » Whole
Body Mineral Density, » Color Doppler Ultra Sonography, » Pathology Laboratory
with computerized Analyzers, Cell Counter, Elisa Tests & Chemiluminescence,
» Computerized Stress Tests System, » Computerized Holter System,
» Neuroelectro Physiology, E.E.G., E.M.G., B.E.R.A. Etc., » Blood Bank (under
Process), » Tele Medicine Network (Tie up with most of the renowned Multi
Speciality Hospitals of India), » Cardiac Pace Maker Implantation with Ventilatory
Support

Hospital Division :

» 135 Bedded fully equipped hospital, » 6 (Six) Operation Theatres attached
with most modern equipment including Monitoring Systems, Ventilators etc.,
» Laparoscopic Surgery, Harmonic Scalpel & Thermoablation, » 26 bedded
I.C.U. I.C.C.U. & N.I.C.U. equipped with most modern monitoring
systems, Ventilators, Infusion Pumps, Blood gas Analyzers, Centralized Piped
Gas & Centralized Suction Unit, » **Dialysis Unit with ultra filtration and
bi-carbonate & Acetate Dialysis.**, Fully equipped Casualty Services round
the clock, » 24 Hours Emergency Diagnostics Services., » Ultra Modern
Physiotherapy Unit, » Most Modern Infertility Clinic, » Ultra Modern Mother &
Baby Care Unit with sophisticated equipment, » High Tech Urology department
with Endoscopic facilities specially designed for various Uro Surgery, » Fully
equipped Dental Clinic.

Introducing Very Shortly :

- » Magnetic Resonance Imaging (MRI)
- » Kidney Transplant Unit under Govt. Process

STROCK, TRAUMA & ACCIDENT CARE
SERVICES FUNCTIONING 24 hrs x 365 days
Under Dr. Arup Borpuzari, M.S., M.Ch.

First to Introduce in
Upper Assam

ALLERGY CLINIC
ALLERGY DETECTION
TEST INCLUDES
140 ALLERGY TESTS

Most Sophisticated
NEUROSURGERY DEPTT.
Under
Renowned Super
Specialist

With Best Compliments from :

SARBA SHIKSHA ABHIYAN , DIBRUGARH



A WORK OF MATURITY; A WORK TO APPRECIATE

'Their tender hands were rough'.

A still from the exhibition in Jyoti Kendras, Dibrugarh, where the working children demonstrated the materials made by their own hands.

'Give them a chance to think and shape their hands on their own way'



REWARD OF DEDICATION

Children receiving gifts and prizes from the District Mission Co-ordinator cum All. Deputy Commissioner, Mr. Amitabh Rajkhowa, Member of Legislative Assembly, Mr. Prasanta Kr. Phukan and District Urban Co-ordinator, Mrs. Nivedita Baruah, for their excellent performance and mainstream to nearby formal schools.



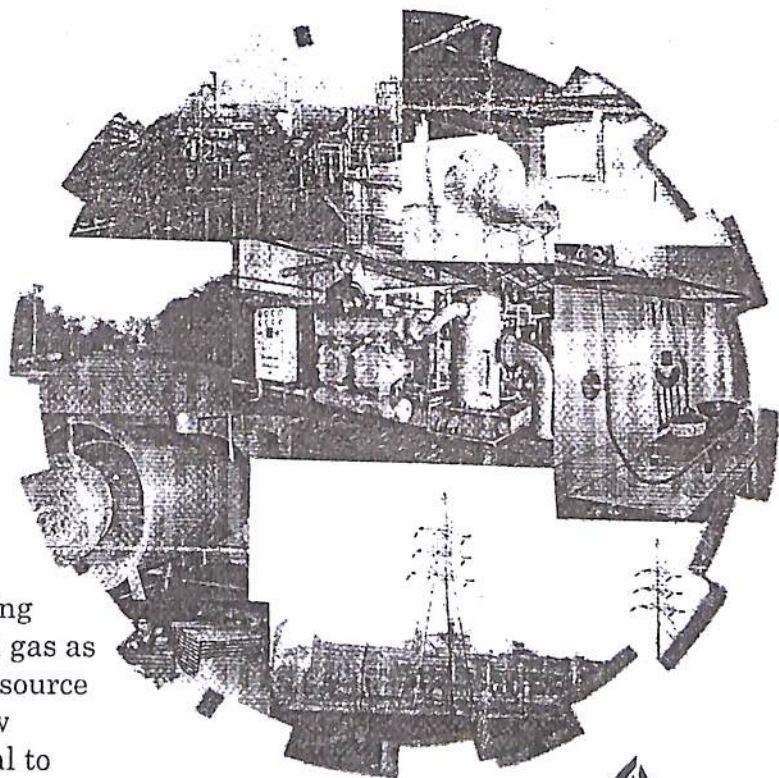
CellOne
The One for everyone

The most reliable & economical
Mobile Service reaching
all corners of Assam


BSNL
Connecting India
www.assam.bsnl.co.in
Assam Telecom Circle



The leader in Natural Gas collection, processing, Transportation and Distribution Business in North East India and Hoping to expand beyond the horizon of North East



Providing natural gas as energy source and raw material to Industries, Commercial establishment and domestic households.



P.O. DULIAJAN, DIST. DIBRUGARH, ASSAM, PIN - 786 602
Ph. : 0374-2800558 / 2800556 / 2800202 / 2800221
Fax : 0374-2800557, E-mail : assamgas@sanchamnet.in
Visit us at : www.assamgas.org