

Research and Training Activities

The Department is supported under DST-FIST & UGC-SAP scheme since 2009 and has received a grant of Rs. 52 lakhs from DST Govt. of India under FIST programme and Rs. 36.5 lakh from UGC under special assistance programme for R & D and overall growth of the Department. Currently, the Department has also availed the assistance of Rs. 83 lakhs under DST-FIST programme (2019-24)

All faculty members are encouraged to develop an independent research group with the freedom to associate with other groups. Our faculty has attracted funds from national agencies like DST-SERB, UGC, CSIR, DAE and other funding agencies. The Department has already undertaken funded projects amounting to Rupees 160 lakh. The faculty members also pursue interdisciplinary intra- and interdepartmental collaborative projects and also with individual groups from industrial and other academic institutions. The Department has a wide range of state-of-the-art instrumentation. Every possible effort is made to update and extend the 'fabric of the laboratory' building to provide the best possible environment for all our research activities.

The broad areas of research interests in the Department span from the traditional such as organic, inorganic, analytical and physical chemistry to interdisciplinary programme in Environmental, Nanotechnology and Materials science, Biological fields etc. Some of the current areas of research are given below:

- ✓ Transition metal catalyzed organic synthesis
- ✓ Design of nanocatalyst for organic transformation.
- ✓ Development of Carbon Quantum Dots for Sensing and Catalytic applications.
- ✓ Development of mesostructured composite oxides as acid-base bifunctional catalysts for various organic transformations of industrial and environmental importance.
- ✓ Development of polymer materials/polymer nanocomposite as fire retardant, pressure sensitive adhesive, super absorbency materials.
- ✓ Development of perovskite type oxides as catalyst and magnetic materials.
- ✓ Stimuli-responsive synthetic functional molecules, and biomaterials for targeted drug delivery systems.
- ✓ Development of oxide-based materials as nano-adsorbent and photocatalysts for remediation of pollutants
- ✓ Development of value-added products from different wastes for various applications.

Instrumental Facility Developed under UGC-DRS (2009-2014) and DST-FIST (2009-2014 and 2019-2024)



(Atomic Absorption Spectrophotometer, Shimadzu, Japan)



(Fluorescence Spectrophotometer, Shimadzu, Japan)



(Dynamic Light Scattering, Malvern, UK)



(IR Spectrophotometer, Shimadzu, Japan)



(Powder XRD, Rigaku, Japan) and many more.....

**35th Annual Conference of Orissa Chemical Society, and
National Seminar on Frontiers in Chemical Sciences (FCS-2021)**

Programme

Saturday, 18th December 2021

8.00 AM-10.00 AM	<i>Breakfast and Registration</i>		
10.00 AM-11.30 AM	Inaugural Session: Chief Guest: Prof. Kishor Kumar Basa, Vice-Chancellor, MSCB University Guest of Honour: Prof. Swaminathan Sivaram, Former Director, NCL Pune		
<i>Tea Break:11.30 AM -11.45 AM</i>			
<i>Technical Session 01</i> Chairperson: Prof. Shashadhar Samal Coordinator: Dr. Amar Kumar Dora			
11.45 AM-12.45 PM	Prof. M. K. Rout Memorial Lecture (ML-1)	Prof. Swaminathan Sivaram Senior Scientist INSA, Honorary Professor IISER Pune, Former Director NCL Pune.	
<i>Technical Session 02</i> Chairperson: Prof. Satyaban Jena Coordinator: Dr. Ashis Kumar Jena			
12.45 PM- 1.30 PM	Invited Lecture 1 (IL-1)	Prof. Narayan Pradhan IACS Kolkata	
<i>Lunch Break/Poster Presentation: 1.30 PM- 3.00PM (PP-01 to PP-61)</i>			
<i>Technical Session 03</i> Chairperson: Prof. Bijay Kumar Mishra Coordinator: Dr. Gobinda Chandra Behera			
3.00 PM- 4.00 PM	Prof. S.R. Mohanty Memorial Lecture (ML-2)	Prof. Tomi Nath Das (OS, Retired) Radiation and Photochemistry Division, BARC	
<i>Technical Session 04 (OCS Award Lectures 2021)</i> Chairperson: Prof. Rupashree Ragini Das Coordinator: Dr. Smruti Pattnaik			
4.00 PM -4.20 PM	AP-1 (2021)	Prof. R. C. Tripathy Memoria l Award Presentation (inside the state)	Dr. Debayan Sarkar, NIT Rourkela
4.20 PM -4.40 PM	AP-2 (2021)	Prof. Dayanidhi Patnaik Memorial Award Presentation	Dr. Rupam Dinda, NIT Rourkela
4.40 PM -5.00 PM	AP-3 (2021)	Prof. G. B. Behera Best Ph.D. Thesis Award Presentation	Dr. Kalyani Prusty, VSSUT Burla
<i>Tea Break:4.30 PM- 4.40PM</i>			
<i>Technical Session 05</i> Chairperson: Prof. Asutosh Samantray Coordinator: Dr. Debasis Mohanty			
5.00PM -6.00PM	<i>Oral Presentation: OL-1 to OL-6</i>		
6.00PM-7.30PM	General Body Meeting		
7.30PM -8.30PM	Cultural Evening		
8.30 PM- 10.00 PM	Dinner		

Sunday, 19th December 2021

9.00 AM - 10.00 AM	Breakfast		
Technical Session 06 Chairperson: Prof. Arun Kumar Padhi Coordinator: Dr. Bigyan Ranjan Jali			
10.00 AM-11.00 AM	Prof. S. R. Mohanty Memorial Lecture (34 th Annual Conference) – ONLINE LECTURE (link will be provided) (ML-3)	Prof. A. K. Mishra, IIT Chennai	
Technical Session 07 Chairperson: Dr. Sarat Chandra Das Coordinator: Dr. Ashok Kumar Roul			
11.00 AM-11.45 AM	Invited Lecture 2 (IL-02)	Dr. Himanshu Sekhar Biswal, NISER Bhubaneswar	
Tea Break 11.45AM-12.00Noon			
Technical Session 08 (OCS Award Lectures 2020) Chairperson: Prof. Nigamananda Das Coordinator: Dr. Bibhuti Bhusan Parida			
12.00 Noon - 12.20 PM	AP-4 (2020)	Prof.R. C. Tripathy Memorial Award Presentation (outside the state)	Dr. Gyan Ranjan Prusty, Dept. of Chemistry, VSSUT Burla
12:20 PM -12.40 PM	AP-5 (2020)	Prof. Dayanidhi Patnaik Memorial Award Presentation	Mr. Ranjit Barik, Dept. of Chemistry, NIT Rourkela
12.40 PM-1.00 PM	AP-6 (2020)	Prof. G. B. Behera Best Ph.D.Thesis Award Presentation	Dr. L. Satish Kumar Acharya, Dept. of Chemistry, NIT Rourkela
1.00 PM-1.20 PM	AP-7 (2020)	Prof.R. C. Tripathy Memorial Award Presentation (inside the state)	Dr. Aneeya Kumar Samantara, NISER Bhubaneswar
Lunch Break 1.20PM-2.30PM			
Technical Session 09 Chairperson: Prof. Sarat Kumar Swain Coordinator: Dr. Arun Kumar Barik			
2.30 PM - 4.00 PM	Oral Presentation: OL-7 to OL-12		
4.00PM-5.00PM	Valedictory Function Chief Guest: Prof. Swaminathan Sivaram, Former Director, NCL Pune Guest of Honour: Prof. Anil Kumar Biswal, Chairman PG Council, MSCB University and Sahadev Samadhia, Registrar, MSCB University Prof. R. K. Nanda Best Oral presentation Award and Dr. Subasini Lenka Best Poster Award Presentation		
5.00 PM-6.00 PM	Site-Seeing		

Venue: Annex Convention Hall, MSCB University

**35th ANNUAL CONFERENCE OF ORISSA CHEMICAL SOCIETY AND
NATIONAL CONFERENCE ON “FRONTIERS IN CHEMICAL SCIENCES” (FCS-2021)
DECEMBER 18-19, 2021**

Sl. No.	Committee	Members
01	Registration	Dr. A. K. Dora Mr. Suvankar Sahu Dr. Bhabani Shankar Mohanta Miss Shibani Priyadarshini Miss Nirlipta Das Miss Shradha Suman Sethi Miss Susmita Mohanty Miss Jyoti Kiran Sahoo Miss Bhagyashree Malik Miss Dumni Hembram
02	Reception	Prof. P. K. Satapathy Dr. R.K.Singh Dr. Ramesh Kumar Behera Mr. Pinaki Prasad Panda Mr. Shiba Narayan Jena
03	Transportation	Dr. L. Behera Dr. Debesh Hota Mr. Debasish Das Mr. Murarilal Barik Mr. Suman Karmakar Mr. Rajesh Das Mr. Sreehari Behera
04	Accommodation	Dr. L. Behera Mr. Biplab Bindhani Mr. Chandan Kumar Pal Mr. Suman Karmakar Mr. Satyajit Panada Mr. Abinash Kumar Panigrahi Mr. Tanmay Sahu
05	Stage Management	Prof. P. K. Satapathy Dr. Cuckoo Mohapatra Dr. Gobinda Behera Miss Debasmita Mohanta Miss Dulari Hansdah Miss Gouri Majhi Miss Monalisa Jena Miss Priyanka Mohanty

06	Cultural	Prof. P. K. Satapathy Dr. Debesh Hota Miss Nilima Sahoo Miss Subhashree Swain Mr. Biswajit Mallick Mr. Biswajit Barik Miss Sushree Suman Panda Miss Arpita Sahoo Miss Sasmita Sahu Miss Sarathi Soren Miss Gayatri Mishra Mr. Shiba Narayan Jena Mr. Abinash Kumar Panigrahi Mr. Tanmay Sahu
07	Refreshment	Dr. Amar K. Dora Dr. Sudhir K. Kisku Dr. Gopal C. Pradhan Dr. Subrat K. Patra Dr. Birendra Nath Mohanty Mr. Kamdev Pati Mr. Sushanta Naik Mr. Shiva Sankar Hembram Mr. Abhijit Mohapatra Mr. Bishnu Prasad Dash Mr. Satyaprakash Rout Mr. Alok Bhutia Mr. Rajat Sethi Mr. Sunaram Murmu Mr. Ruhya Singh
08	Technical Committee	Dr. A. K. Dora Mr. S. N. Bisoi Dr. S. S. Basa Dr. Sudhir K. Kisku Dr. Bighnanashu K. Jena Dr. Sudarsan Singh
09	Photography and Media	Dr. A. K. Jena Dr. Suwendu Das Mr. Bhubanananda Mohanta
10	Publication Committee (Proceedings)	Prof. P. K. Satapathy Dr. R. K. Singh Dr. A. K. Jena Dr. Swagatika Sahu

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Memorial Lectures

About Prof. (Dr.) Mahendra Kumar Rout:



Birth: Dt. 04.01.1924

Death: Dt. 07.02.1990

Prof. (Dr.) Mahendra Kumar Rout was the Founder President of Orissa Chemical Society. Prof. Rout was born in Bhadrak on 4th January 1924 and did his Matriculation from Patna University in 1938. He did his Bachelor's Degree from Ravenshaw College and Postgraduate Degree in Chemistry from Patna Science College. He was awarded Ph.D. degree from Utkal University in 1952. His fields of research interest were organic synthesis on drugs and biologically active compounds, dyes, and natural products. He started his career as Lecturer in Chemistry from Ravenshaw College and became Professor and Head of the Department of Chemistry, Principal of Ravenshaw College, Director of Public Instruction, Government of Odisha, and Vice-Chancellor of Utkal University. After retirement, he took the responsibility of Chairman Pollution Control Board, then Chairman of All India Banking Recruitment Board. Prof. Rout remained as the President of OCS for consecutively three years (1986, 1988, 1989). During his tenure as the President, the First Annual Conference of OCS was held in Ravenshaw College, Cuttack, on June 28-29, 1986. The Second Annual Conference was held on January 25-26, 1988, in P. N. College, Khurda. On March 26-27, 1989, the Third Annual Conference was held in Khallikote College, Berhampur. He passed away at the age of 66 on February 07, 1990. Since then, Odisha Chemical Society is organizing Prof. Mahendra Kumar Rout Memorial Lecture in its Annual Meetings and also giving awards to winners of Prof. Mahendra Kumar Rout essay competition to commemorate the contributions made by him to chemistry education and research as well as for his services to the OCS.

Prof. M. K. Rout Memorial Lecture

Dr. Swaminathan Sivaram

Dr. Swaminathan Sivaram is a polymer chemist by profession and a mentor as well as a science administrator of distinction. He is a former Director of the CSIR – National Chemical Laboratory, Pune (2002-10), Shanti Swarup Bhatnagar Fellow of CSIR (2010-2015) and J. C. Bose Fellow of the Department of Science and Technology (2006-2014). Currently, he is an Honorary Professor Emeritus and INSA Emeritus Scientist at the Indian Institute of Science Education and Research (IISER), Pune.



Dr. Sivaram is a highly decorated scientist with numerous awards and honours to his credit. He was conferred Padma Shri by the President of India in 2006. He is a recipient of the Gold Medal of the Chemical Research Society of India for his life-time achievements in chemistry (2019) and the International Award for distinguished contributions to polymer science, awarded by the Society of Polymer Science, Japan (2017). Dr. Sivaram earned his Bachelor of Science degree in Chemistry from Madras Christian College (1965) and is a distinguished alumnus of IIT-Kanpur (M.Sc., 1967). He earned a PhD in Chemistry and DSc (h.c) from Purdue University, W. Lafayette, Indiana, USA. He is an elected Fellow of all the learned academies of science and engineering in India as well as The World Academy of Sciences, Trieste, Italy. He is a technical consultant to several reputed Indian companies and serves on the Board of Directors of many leading Indian companies dealing with chemicals and materials. He was a founder Chairman and director of Venture Centre, A Section 8 company, Pune one of the first science driven technology business incubators established in India in 2004.

Dr. Sivaram 's research interest concerns polymer synthesis, surface chemistry of polymers, porous polymers for energy related applications, biodegradable polymers, organic-inorganic hybrids, nanocomposites and structure-property relationship in polymers. This apart, he is deeply interested in subjects such as sustainability issues, sustainable energy technology and policies, history of science as well as understanding the inter-play of science, technology and public policies. He has authored close to two hundred and fifty papers in peer-reviewed journals, edited two books and authored one book. He is cited as an inventor in fifty-one issued US and European patents as well as fifty-two Indian patents. He has supervised the doctoral thesis of about forty students and mentored over fifteen post-doctoral fellows in a research career spanning fifty years.

ML-1

THE FUTURE OF CHEMISTRY

Dr. S. Sivaram

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Abstract: Chemistry creates its own objects. This creative power, similar to that of arts, distinguishes it fundamentally from other natural sciences “, a statement attributed to Marcellin Berthelot, one of the greatest chemists known (1827-1907) captures the mission of chemistry so elegantly. Our physical environment, material culture, conceptual systems and manner of living have been or are being changed by chemical science.

Chemistry has always been the earthiest, practical and the most central of the sciences. Its earthiness, its connection to the colors, smells, and sounds of substance and of changes, stretches backward into the mists of alchemy. But its earthiness also extends into the huge, complex business enterprises of our day, in petrochemicals, pharmaceuticals, plastics, advanced materials, agriculture, biotechnology, transportation and electronics.

The discipline of chemistry is in the midst of tectonic change. Our knowledge has infinitely expanded with rapid advances across all disciplines of chemistry. Chemistry underpins the understanding of the world around us. The science of chemistry has made stupendous progress towards understanding and manipulating matter in a manner unforeseen and inconceivable to our ancestors. Chemistry has led to a deep understanding of the molecular basis of our life and mechanism of diseases as well as discovery of therapeutic molecules. Our ability to produce food for the growing human population is another example of the power of chemistry. Inexpensive energy, human mobility and the revolution in computational and communication technologies could not have occurred but for discoveries in chemical science and technology. Chemistry and chemical industry are the single largest contributor to human prosperity post industrial revolution and one of the largest sources of employments for people worldwide.

The rapid integration of chemistry, both, within its own sub disciplines and with other disciplines, such as, biology, computational science, material science and physics is the distinguishing hallmark of twenty first century chemistry. The boundaries between chemistry and other disciplines are becoming fuzzier. The key motivation for this integration is the inability of individual and stand-alone disciplines to provide answers to some of the most emergent and complex problems facing humanity. Chemistry is also moving away progressively from the “reductionist” approach to “systems” approach in search of new solutions. Given that the primary activities of chemistry are to

analyse, synthesize, and transform matter the practice of chemistry has a great deal to contribute to sustainability science, which in turn, will play an increasingly important role in reshaping the practice of chemistry. Success in integrating sustainability considerations into the practice of chemistry implies a better understanding of the molecular basis of sustainability of earth and societal systems and embedding systems thinking in the practice of chemistry to consider the complex interplay of chemical process with scientific, societal, and environmental systems.

What then is the future of chemistry in this century? What are the forces that are currently providing impetus to this science? How do we reorganize scientific research for future relevance? How should we reshape chemical education for tomorrow's needs? This lecture will address some of these issues. I will trace the evolution of chemistry from its early origins to present day status and define the scope and breadth of chemistry as a discipline today. Chemistry is also intricately related to society and is perceived as, both, good and bad. There is a need to communicate chemistry to society in a manner that it neither creates a scare in the minds of citizens nor it down plays the ill effects of chemistry on society. In the end science of chemistry can only survive if we as citizens respect it for the good it does to our planet and lives and seek ways to minimize the adverse impact of practice of chemistry on the society.

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About Prof. (Dr.) S. R. Mohanty:



Birth: Dt. 01.09.1921

Death: Dt. 12.05.1982

Prof. S. R. Mohanty was born on 1st of September 1921 in the village Kanteikoli of Ganjam District. He completed his I.Sc. from Khallikot College, Berhampur, B.Sc. from Vizianagaram, Andhra Pradesh, M.Sc., Ph.D., D.Sc. from Banaras Hindu University, Varanasi. Then he joined as a Lecturer in Chemistry at BHU and was promoted to the post of Reader in the same Department in 1962. In 1967 he joined in the Utkal University, Bhubaneswar as the founder Professor of its P.G. Department of Chemistry. He was an erudite scholar and research worker. He worked on different aspects of Physical Chemistry. In the department of Chemistry, Utkal University he established an excellent research laboratory to work on the annealing of radiation damage in solids and solvent extraction of radioactive elements. He has successfully guided 32 Ph.D. students including about 12 students who received Ph.D. under his guidance during his short stay in this Department of Chemistry, Utkal University. He has published more than 175 research articles in national and international journals including several papers published in Nature. In 1979, he joined as the Administrator of Berhampur University and later became the Vice- Chancellor of the same University. He passed away on 12th May 1982. His sad and untimely demise while in office was a great blow to the academic community in the state.

Tomi Nath Das

Tomi Nath Das received his Bachelor's degree in Chemistry from University of Delhi, Master's from IIT Kanpur, and the Ph.D. from the University of Bombay, Mumbai. Starting 1978 till 2016, he worked as a Scientific Officer at the Bhabha Atomic Research Center, Department of Atomic Energy in various laboratories situated at Srinagar, Gulmarg, and Mumbai. His research included homogeneous and heterogeneous atmospheric trace level chemical reactions, nuclear radiation and photo-induced free radical chemistry in condensed media, and Cold Plasma induced gas-phase and on-surface chemistry. His Post-Doctoral Research at the National Institute of Standards and Technology, Gaithersburg, Maryland, USA, focused on the Mechanistic Free-radical Chemistry in Condensed Media. Since 2006 he initiated and led the Research and Development exploring cold plasma generations and its utilitarian Free-radical chemistry in multiphase environments and on living and non-living surfaces. Currently, he mentors Cold Plasma research initiatives in physical and biological environments at Ravenshaw University, Cuttack and KIIT, Bhubaneswar.



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Prof. S. R. Mohanty Memorial Lecture

Mimicking Nuclear Radiation-Induced Chemistry with Friendly Cold Plasma

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Abstract: Chemistry research that aims to address and solve myriad challenges is ultimately evaluated or judged from utilitarian points of view. A successful endeavor, therefore, not only generates a sense of satisfaction and opens up fresh research directions; it may also substantiate the novelty and apt use of the experimental strategy and methodology chosen therein.

Diversity in respect of research strategies, aided by improvement and availability of associated instrumental facilities, progressively allows more complex topics, which seemed beyond reach previously, to be addressed and solved. In this context, systematic estimations of the reaction physicochemical parameters and the underlying step-wise reaction mechanism in any chosen *chemical system* have always remained important features of research. Such quantification not only allowed user control of similar reactions if desired but also helped to alter or enhance productivity in a selective manner by tinkering with the reaction environment.

A large variety of chemical changes are often initiated either in an oxidative or reductive environment. “*Nuclear Radiations*” (NR) such as high energy γ - and X-rays (*em* radiation), and particles such as β^- etc. from radioactive decay have the ability to generate selective *redox* environments in a variety of fluid media. Thus, for more than half a century, machines such as particle accelerators and gamma-chambers (*including non-nuclear sources such as LASERs and UV-vis light*) were routinely deployed as sources for convenient and speedy evaluations of various types of physicochemical parameters. Such measurements made the world over in different facilities and laboratories have played a pivotal role in enriching our shared knowledge base.

In the last decade and a half, an exciting technology involving Cold Plasma (CP) has emerged and matured rapidly to challenge the vastly expensive and very complex hardware systems employed in the above-mentioned NR-assisted measurements. Though the CP science and technology has a history of over 150 years, it remained completely dormant or sparsely researched till the 1980s, mainly due to ignorance. At present, setting up a CP experimental facility or laboratory is an uncomplicated, straightforward, and quite easy to finance proposition. Convenient tuning of CP generation currently makes it one of the user-friendliest technologies available for contribution in a variety of application areas, including the creation of selective *redox* environments. Worldwide various laboratories and institutes have found profitable use and application in diverse and novel areas such as pollution control and mitigation, material surface modification, in biology, health and

healing, nanomaterials and fabrications, polymers, enhanced vehicular engine performance towards a greener environment, *etc.* to name a few.

This presentation endeavors to make the audience aware of the “*tricks of the CP trade*” and reveal some recent multi-phase, *atypical*, or innovative utilitarian chemistry, including some carried out in our laboratory.

Ashok Kumar Mishra

Prof Ashok Kumar Mishra completed his Master of Science from University of Delhi in 1980 and received PhD from IIT Kanpur in 1985. After a stint in Sambalpur University as a faculty member, and in Gunma University (Japan) as a Monbusho fellow, he joined IIT Madras in 1992. He was a JSPS Visiting Scientist in Gunma University, Japan during 2002-2003. He was Dean Academic Research at IIT Madras during 2015-21. Currently he is working as an Institute Chair Professor in the Department of Chemistry, IIT Madras.



Prof Mishra is a Fellow of the 'National Academy of Sciences, India'. Awards received by him include 'CRSI Bronze Medal' from the Chemical Research Society of India, 'Acharya P C Ray Memorial Award' from Indian Chemical Society and 'Prof W U Malik Memorial Award' from The Council of Chemists.

Prof Mishra works in the general area of *Physical Photochemistry* and *Fluorescence Spectroscopy*. He has an active research group. So far he has guided 27 PhDs, many M.Sc. students, and published about 220 research papers, reviews and monographs.

ML-3

Prof. S. R. Mohanty Memorial Lecture (For the Year 2020)

Extending the Frontiers of Fluorescence Spectroscopy

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Fluorescence Spectroscopy deals with the study of photons emitted from the photo-excited singlet electronic states of molecules and materials. Properties of fluorescence emission strongly reflect the photophysical processes that the molecules/materials undergo during the lifetime of their excited singlet state. Interactions of certain molecules/materials in their photo-excited state and the consequent changes in the fluorescence parameters enable fluorescence based molecular level probing/sensing/imaging at submicrometric space resolutions. The fluorescence parameters monitored include emission wavelength, emission intensity, fluorescence anisotropy, and the time-dependent changes of these parameters at nanosecond time scale.

This talk will present some glimpses of the research carried out in our laboratory at IIT Madras over the past three decades. After introducing fluorescence spectroscopy and the relevant photophysical processes, the talk will focus on two major components: (i) our research ON fluorescence spectroscopy, which will present some new understanding of fluorescence inner-filter effect, the fluorescence of ‘complex multifluorophoric systems’, as well as our contribution to the growing research on fluorescence instrumentation; and (ii) our research WITH fluorescence spectroscopy, which will present some new fluorescent molecules and new fluorescence based probing concepts introduced by us, which were used for understanding a variety of soft matter systems.

Invited Lectures