# SURESH DAS, FNA, FASc

# J. C. Bose National Fellow, CSIR-National Institute for Interdisciplinary Science and Technology

*( Executive Vice-President, Kerala State Council for Science, Technology and Environment*
*&*
*Ex-Officio Principle Secretary, Science and Technology,*
*Government of Kerala)*

*(Formerly Director, CSIR-National Institute for Interdisciplinary Science and Technology*
*CSIR-NIIST), Trivandrum – 695 019)*

## Personal Profile


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| **Date and place of Birth** | : | Orissa, India, February 18, 1955 |
| **Status** | : | Married |
| **Nationality** | : | Indian |
| **Res. Address** | : | Aishwarya, VRA- 19<br>Mannanthala<br>Trivandrum - 695 015<br>Tel. : +91-471- 2543557 (off.) / 2544309 (res.)<br>Fax : +91-471- 2540085<br>Cell : 9447706202<br>E-mail : sureshdas55@gmail.com |


## Education (Degrees)

- B. Sc. (University of Poona), 1975
- M. Sc. (University of Baghdad, Iraq), 1977
- Ph. D. (University of Newcastle upon Tyne, UK), 1981

## Awards & Distinctions

1. "Sastra-CNR Rao Award" for Excellence in Chemistry & Materials (2014)
2. Dr. K. K. G. Menon Memorial Lecture, ICT, Mumbai (2014)
3. Honorary Professor JNCASR, Bangalore
4. Honorary Fellow, Kerala Academy of Sciences (2018)
5. J. C. Bose National Fellowship, DST(2013)
6. MRSI Distinguished Lectureship Award (2013)
7. Asian and Oceanian Photochemical Society Award (2012)
8. Fellow of the Indian National Science Academy (2011)
9. Silver Medal, Chemical Research Society of India (2009)
10. A. V. Rama Rao Prize Lecture, JNCASR, Bangalore (2008)
11. Materials Research Society of India Medal (2007)
12. Fellow of the Indian Academy of Sciences, Bangalore (2005).
13. INSA-JSPS Visiting Fellowship (2003)
14. Bronze Medal, Chemical Research Society of India (2000)

## Editorial and other Responsibilities

1. President, Materials Research Society of India (MRSI)
2. Member, National Advisory Committee of National Center of Excellence for Large Area Flexible Electronics (NCFlexE) at IIT Kanpur.
3. Council Member, Asian and Oceanian Photochemical Society (2002-2008)
4. Council Member Chemical Research Society of India (2008- 2010)
5. Editorial Board Member, J. Photochem. Photobiol. C: Reviews (2014 onwards)
6. Editorial Board Member, J. Photochem. Photobiol. A: Chemistry (2005-2013)
7. Member, Governing Board, Rajiv Gandhi Centre for Biotechnology, Trivandrum
8. Member Governing Board, Sri Chitra Institute for Medical Sciences and Technology, Trivandrum
9. Member, Scientific Advisory Committee, Hindustan Lifecare Ltd.
10. Member, PAC, Solar Energy Science, DST
11. Chairman DST FIST Committee for Colleges

## Professional Experience

After obtaining his Ph. D. degree from The University of Newcastle upon Tyne, U. K. Dr. Das worked as a post-doctoral fellow at the Max Planck Institute for radiation Chemistry at Mûlheim. Following this he worked as a post-doctoral Fellow at the radiation laboratory of the University of Notre-Dame, USA and at the University of Houston, USA. On returning to India in 1988, he took up an assignment at TIFR, Mumbai as a Visiting Fellow, and subsequently joined CSIR-NIIST (then RRL-Trivandrum) as scientist C and Head Photochemistry Research Unit in 1989. His assignment was to establish photochemistry research at CSIR-NIIST. He subsequently became Head of the Chemical Sciences and Technology Division in 2004 and Director of CSIR-NIIST in 2009. After Superannuation in 2015 he took charge as Executive Vice President of the Kerala State Council for Science Technology and Environment.

## Highlights of Achievements

- As Director of the CSIR-National Institute for Interdisciplinary Science and Technology since 2009, has contributed to making the institute one of the leading centers in India for basic and applied research in the country. During this period the Institute has also seen substantial improvement in its infrastructure. He has encouraged interdisciplinary across the various divisions of the institute and has significantly improved interaction of the institute with industries.
- As cluster director of the CSIR-Chemistry Cluster consisting of 9 CSIR Institutes, played a major role in formulation and finalization its 12'th Five Year Plan Projects of the Cluster.
- Coordinator of the Indian consortium of Institutes (IISER-Tvm, IISc-Bangalore, JNCASR-Bangalore, Univ. of Madras and NIIST-Tvm) in the Indo-EU project under the competitive Seventh Framework Program (FP7) on "Organic and Organic-Inorganic Hybrid Solar Cells: Optimization of Material Properties, Bulk Heterojunctions, Morphology and Device Efficiencies" funded by DST. The partners for this program funded by the EU include Univ. of Bayreuth, Germany, Technische Univ. Eindhoven, Netherlands, Technical University of Denmark, Mekoprint-Denmark and Ben Gurion Univ. of the Negev,-Israel.
- Played a principal role in the getting approvals for establishing the National centre for Molecular Materials under DST at Trivandrum. Prepared the Detailed Project Report (DPR) for consideration of DST, for establishing a "National Center for Molecular Materials" at Thiruvananthapuram, with DST as the nodal implementing agency and presented it to the Finance Committee for approval.
- As Head Chemical Sciences and Technology Division, initiated and coordinated a successful CSIR-Network program on development of organic materials for photonic and electronic applications, with NIIST-Trivandrum as the nodal laboratory and NCL, Pune and CLRI, Chennai as participating laboratories.
- As Head of the newly established Photochemistry Research Unit in 1989, at the Regional Research Laboratory, Trivandrum, was instrumental in setting up state of the art facilities for conducting advanced research in basic and applied aspects of photochemistry, and for leading the Unit (subsequently renamed as

the Photosciences and Photonics Section), to its present reputed national and international status.

- Conducted sponsored projects on development of photochromics for commercial applications, funded by Corning-SAS, France for the past three years. Project 1: Euros 49,000.00 (2006-2007); Project 2: Euros 68,000.00 (2007-2008); Project 3: Euros 68,000.00 (2008-2009); Project 4: Euros 80,000.00 (2009-2010).
- Principal Investigator of several sponsored projects including a DST sponsored IRPHA project on development of organic materials for photonic applications.
- Conducted various international collaborative projects including a Volkswagen funded program with the Max Planck Institute at Gottingen, Germany; DST-JSPS supported interactions with the National Institute of Advanced Industrial Science and Technology Tsukuba, Japan.
- Locally coordinated CSIR Task force programs of NIIST-Trivandrum on organic light emitting materials and functional nanomaterials.
- Convener of International Symposia on Photochemical Sciences held in 1998, 2001 and 2004 at Trivandrum.
- Convener of DST-JSPS Indo-Japanese Joint seminar on Recent Trends in Molecular Materials research at Trivandrum in January 2008.
- Guest Co-editor, Research on Chemical Intermediates, Vol. 25, No.6, Parts 1-4 (1999).
- Guided research programs of 24 doctoral students.
- Published over a hundred research articles in international journals/books.
- Secured international and national patents on photoresponsive materials.
- Delivered several invited lectures in National and International Symposia in India and abroad.

## Scientific Contribution

Dr. Das has made significant contributions in the area of Photosciences and Photonics, where he has been principally concerned with the design and study of novel photoresponsive materials with potential applications in imaging, solar energy conversion and photobiology. He has developed and investigated a large number of photoresponsive liquid crystals using a variety of strategies including covalent linkage of photoisomerizable units to mesogenic units, supramolecular hydrogen bonding and synthesis of metallomesogons containing photoisomerizable groups. His fundamental studies in this area have led to the development of novel photoresponsivecholesteric liquid crystals useful as erasable direct read after write (EDRAW) devices capable of recording full colour images. A patent based on this work was filed in Japan and India and the work was also highlighted in Chemistry and Industry, U. K. His work on photoresponsive materials has also attracted the attention of Corning SAS, France a leading company involved in developing and marketing photochromic lenses, which has sponsored projects at CSIR-NIIST for over a period of five years for developing novel photochromic dyes. Subsequently SABIC also sponsored a major project with CSIR-NIIST on the same topic. His investigations on sensitizers for Dye sensitized solar cells has attracted significant attention and the strategy developed by his group is routinely used by international groups to design new dyes for such applications. Based on the expertise developed, CSIR-NIIST is considered as the lead institute in the country in the area of photosciences and photonics the institute has been a nodal laboratory for many CSIR programmes related to photonics including several projects involving development of organic solar cells and light emitting diodes and sensors for various biomedical applications.

## Contribution as Director CSIR-NIIST

Several technologies developed at CSIR-NIIST during this period have also won national awards and benefited industries. He has successfully encouraged interdisciplinary interaction across the various divisions of the institute, focusing on strengthening activities related to the chemistry-materials interface, the chemistry-biology interface and appropriate/rural technology. During his tenure as director he has recruited about 27 new scientists including As Director of the CSIR-National Institute for Interdisciplinary Science and Technology since 2009, has contributed to making the institute one of the leading centers in India for basic and applied research in the country by encouraging both excellence and relevance of the scientific contribution of CSIR-NIIST. During this period a bibliometric study undertaken by NESTA a UK based agency has rated CSIR-NIIST as one of the best

performing institutes in the country with regard to the quality of its publications. The 2016 version of the SCImago Institutions Rankings (SIR) report showed that CSIR-NIIST had improved its world ranking from 617 in 2009 to 425 in 2015. chemists, physicists, biologists and engineers and helped them establish their own activities in tune with the Institute objectives as well as encouraging them to work together as teams to collaborate with external organizations including institutions, industries and Government. As a result the Institute today has capabilities ranging from functional materials and device development to bio-prospecting and bio-screening. This has led to meaningful interactions with industries and organizations which include the Regional Cancer Centre Trivandrum, M. S. Swaminathan Foundation at Wayanad for rare and extinct plants, Indian Rare Earths, Hindustan Lifecare Ltd. as well as international companies such as SABIC- Saudi Arabia and Noritake-Japan. During this period the Institute has also seen substantial improvement in its infrastructure, which include a new Biotechnology Laboratory, Biofuel Pilot Plant for, Photosciences and Photonics Laboratory and a women student's hostel. A new building to house the Chemical Sciences and Technology Division was completed. This led to an overall addition of 60,000 sq.ft. of built up area for R&D activities. This development has been matched with a substantial improvement in the instrumentation support required for the various research activities of the Institute. As cluster director of the CSIR-Chemistry Cluster consisting of 9 CSIR Institutes, played a major role in formulation and finalization its 12'th Five Year Plan Projects of the Cluster. As a member of the Research Council of many of the CSIR labs in the chemistry cluster played an important role in reviewing their activities.

## Contribution as Executive-Vice President of the Kerala State Council for Science and Technology

During his tenure as EVP of KSCSTE, Dr. Das had helped to stabilize the organization and streamline its activities and abilities to develop science and technology in Kerala by consolidating its diverse activities into five focus areas. As Ex-officio Principal Secretary of the Science and Technology Department of Kerala, his duties were to advise the Government and help find S&T solutions to many of the development problems of the State. Dr. Das had developed several new programmes including the Partnering Academia and Industry (PAIR) program and the A P J Abdul Kalam Youth challenge. The PAIR programme is designed to encourage translational research leading to the development of processes or products beneficial to society through a well-articulated tripartite agreement between KSCSTE, academic/R&D institution and industry. Through this programme industries sponsor Ph. D. fellowships with KSCSTE taking care of the contingency grant and academic institutes are encouraged to work on industrially relevant projects. The A P J Abdul Kalam Youth Challenge programme targets youth of the State encouraging them to propose innovative ideas for solving the problems of relevance to the State of Kerala. Any permanent resident of Kerala below 30 years can submit proposals in selected areas, with upto 10 proposals being provided maximum of ₹ 5 lakhs for developing the prototype/working model following which the best innovation among them is selected for further support of ₹ 50 lakhs, along with technical support and guidance for developing the technology. During the period that Dr. Das was EVP, the Chief Minister of Kerala had also entrusted KSCSTE the responsibility of establishing a new institute for research on virology. An Institute for Advanced Virology (IAV) with and a new 70,000 sq ft equipped building and initially required human-power is taking shape and the institute is expected to be inaugurated in January.

## List of Publications

| S. No. | Date | Title | Name of Journal |
|---|---|---|---|
| 1. | 2017 | Photodynamic Therapeutic Efficacy of Symmetrical Diiodinated Squaraine in *in vivo* Skin Cancer Models | Photodiagnosis and Photodynamic Therapy 18, 302. |
| 2. | 2017 | Self-Assembling and Luminescent Properties of Chiral Bis-oxadiazole Derivatives in Solution and Liquid Crystalline Phases, | J. Phys. Chem. B 121, 1922. |
| 3. | 2017 | Novel Glyco-conjugated Squaraine Dyes for Targeted Tumor Imaging, | Chem. Comm. 53, 5433 |
| 4. | 2016 | Self-Assembly and Mechanochromic Luminescence Switching of | J. Mater. Chem. C, 4, 9588 |

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| | | Trifluoromethyl Substituted 1, 3, 4-Oxadiazole Derivatives | |
| 5. | 2016 | Modulating FRET in Organic-Inorganic Nanohybrids for Light Harvesting Applications | J. Phys. Chem. C 120, 26569. |
| 6. | 2016 | Direct Observation of Cascade of Photoinduced Ultrafast Intramolecular Charge Transfer Dynamics in Diphenyl Acetylene Derivatives: Via Solvation and Intramolecular Relaxation,. | J. Phys. Chem. B 120, 7016. |
| 7. | 2015 | Strategies for Optimizing the Performance of Carbazolethiophene Appended Unsymmetrical Squaraine Dyes for Dye-Sensitized Solar Cells | Phys.Chem.Chem.Phys., 17, 23095 |
| 8. | 2015 | Vesicle-to-rod transition of polymer aggregates upon Irradiation | Macromol. Chem. Phys., 216, 1997 |
| 9. | 2015 | Transformation of Photophysical Properties from Solution to Solid State in Alkoxy Cyano Diphenyl Acetylene Molecules | Phys. Chem. Chem. Phys., 17 18768 |
| 10. | 2014 | Photoresponsive glycopolymer aggregates as controlled release systems | Macromol. Chem. Phys. 2014, 215, 2365 |
| 11. | 2014 | Symmetrical diiodinated squaraine as an efficient photosensitizer for PDT applications: Evidence from photodynamic and toxicological aspects | Chemico-Biological Interactions, 222, 44 |
| 12, | 2014 | Photoresponsive glycopolymer aggregates as controlled release systems | Macromol. Chem Phys., 2014, 2365 |
| 13. | 2014 | Supergelation via Purely Aromatic π–π Driven Self-Assembly of Pseudodiscotic Oxadiazole Mesogens, | J. Am. Chem. Soc., 136, 5416−5423. |
| 14. | 2014 | Bulk photovoltaic effect in organic polar crystals, | Chem. Comm., 50, 6530-6533 |
| 15. | 2014 | Synthesis and Characterization of Near-Infrared Absorbing Water Soluble Squaraines and Study of their Photodynamic Effects in DLA Live Cells | Photochemistry and Photobiology, 90, 585-595. |
| 16. | 2013 | Complementary co-sensitization of an aggregating squaraine dye in solid-state dye-sensitized solar cells | Dyes and Pigments, 2013, 99, 1101-1106. |
| 17. | 2013 | Asymmetric Squaraine Dyes: Spectroscopic and Theoretical Investigation | J. Phys. Chem. B ,2013, 117, 8536–8546 |
| 18. | 2013 | Optical Investigation of Self-Aggregation of a Tetrazole-Substituted Diphenylacetylene Derivative: Steady and Excited State Dynamics in Solid and Solution State | J. Phys. Chem. C, 117, 9404–9415 |
| 19. | 2013 | Highly selective and sensitive colourimetric detection of Hg2+ ions by unsymmetrical squaraine dyes | Dyes and Pigments, 96, 714-721. |
| 20. | 2013 | Photocleavable glycopolymer aggregates | Polym. Chem. 4, 623-628. |
| 21. | 2012 | Trigonal 1,3,4-oxadiazole-based blue emitting liquid crystals and gels | J. Phys. Chem. B , 2012, 116, 13071-13080 |
| 22. | 2012 | A photoresponsive fluorescent glycopolymer | Polym. Chem., 3, 2619-2624. |
| 23. | 2011 | Photoresponsive Soft Materials: Synthesis | J. Polym. Sci. Part A: Polym. Chem., 49, 5063- |

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| | | and Photophysical Studies of a Stilbene-Based diblock Copolymer | 5073 |
| **24.** | 2011 | Photoresponsive Self-Assembling Structures from a Pyrene-Based Triblock Copolymer | J. Polym. Sci. Part A: Polym. Chem., 49, 4448-4457. |
| **25.** | 2011 | Role of Molecular Packing in Determining Solid-State Optical Properties of π-Conjugated Materials | J. Phys. Chem. Lett., 2, 863-873. |
| **26.** | 2010 | Butadiene Based Photoresponsive Soft Materials | Langmuir. 2010, 26, 1598-1609 |
| **27.** | 2010 | Light Induced Generation of Stable Blue Phase in Photoresponsive Diphenyl-butadiene Based Mesogen, | Chem. Commun. 46, 2796-2798. |
| **28.** | 2009 | Correlation between Solid-State Photophysical Properties and Molecular Packing in a Series of Indane-1, 3-dione Containing Butadiene Derivatives | J. Phys. Chem. C.2009, 113, 11927-11935 |
| **29.** | 2009 | Tuning Microstructures in Organogels: Gelation and Spectroscopic Properties of Mono- and Bis-cholesterol-Linked Diphenylbutadiene Derivatives | Langmuir, 25, 8507-8513. |
| **30.** | 2009 | Formation of Highly Luminescent Supramolecular Architectures Possessing Columnar Order from Octupolar Oxadiazole Derivatives: Hierarchical Self-Assembly from Nanospheres to Fibrous Gels, | Adv. Funct. Mater. 19, 2064-2073. |
| **31.** | 2009 | Indane-1,3-dione and Cholesterol Containing Butadiene Derivatives: Photoresponsive Liquid Crystalline Glasses for Imaging Applications | J. Photochem. Photobiol. A: Chem. 207, 73-78 |
| **32.** | 2008 | Photoresponsive Glass-Forming Butadiene-Based Chiral Liquid Crystals with Circularly Polarized Photoluminescence | Adv. Funct. Mater. 18, 2510-2517. |
| **33.** | 2008 | Manifestation of a Chiral Smectic C Phase in Diphenylbutadiene-Cored Bolaamphiphilic Sugars | Adv. Funct. Mater. 18, 1632-1640. |
| **34.** | 2008 | Solid State Optical Properties of 4-Alkoxy-Pyridine Butadiene Derivatives: Reversible Thermal Switching of Luminescence, | J. Phys. Chem. C. 112, 8429-8437. |
| **35.** | 2008 | Molecular Packing and Solid-State Fluorescence of Alkoxy-Cyano Substituted Diphenylbutadienes: Structure of the Luminescent Aggregates | J. Phys. Chem. C. 112, 2137-2146. |
| **36.** | 2007 | Aggregation and Photoresponsive Behavior of Azobenzene-Oligomethylene-Glycopyranoside Bolaamphiphiles | Photochem. Photobiol. A., 189, 405-413 |
| **37.** | 2007 | Aggregation Properties of Heavy Atom Substituted Squaraine Dyes: Evidence for the Formation of J-Type Dimer Aggregates in Aprotic solvents | J. Phys. Chem. A. 111, 3226-3230 |
| **38.** | 2007 | Design and Synthesis of Squaraine based Near Infrared Fluorescent Probes | Tetrahedron.2007, 63, 1617-1623 |
| **39.** | 2006 | Hierarchical Self-Assembly into Photoresponsive Vesicles and Gels by | Angew. Chem. Int. Ed. 45, 6317-6321 |

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| | | Donor-Acceptor Substituted Butadiene Amphiphiles | |
| **40.** | 2006 | Reversible Thermal and Photochemical Switching of Liquid Crystalline Phases and Luminescence in Diphenylbutadiene-Based Dimesogens | J. Am. Chem. Soc., 128, 7692-7698. |
| **41.** | 2006 | A Squaraine-Based Chemosensor for Hg2+ and Pb2+ | Tetrahedron.2006, 62, 605-610 |
| **42.** | 2005 | Fluorescent Aggregates of 1-(p-Butyloxyphenyl)-4-(p-cyanophenyl)buta-1E,3E- diene: Temperature Sensing and Photoimaging Applications, | Fluorescence.2005, 15, 749-753. |
| **43.** | 2005 | Observation of a Chiral Smectic Phase in Azobenzene-Linked Bolaamphiphiles Containing Free Sugars | Adv. Funct. Mater. 15, 1579-1584. |
| **44.** | 2005 | Dye Sensitization of NanocrystallineTiO2 : Enhanced Efficiency of Unsymmetrical Versus Symmetrical Squaraine Dyes | J Photochem. Photobiol. A: Chem. 172, 63-71. |
| **45.** | 2004 | Observation of a Non-Conventional Horner-Wadsworth-Emmons Olefination Product and the Effect of the Lateral Ethyl Substitution on Their Solid State Fluorescence | New. J. Chem. 28, 1368-1372. |
| **46.** | 2004 | Butadienes as Novel Photochromes for Colour Tuning of Cholesteric Glasses: Influence of Microscopic Molecular Reorganization Within the Helical Structure | Adv. Funct. Mater.2004, 14, 743-748. |
| **47.** | 2004 | Synthesis and Study of Novel Azopyridine-Containing Hexacatenar Silver Mesogens | Liq. Cryst. 31, 713-717. |
| **48.** | 2004 | Thermally Reversible Fluorescent Polymorphs of Alkoxy-Cyano Substituted Diphenylbutadiene: Role of Crystal Packing in Solid State Fluorescence | Chem. Commun., 1, 74-75. |
| **49.** | 2004 | Synthesis, Fluorescence and Photoisomerization Studies of Azobenzene Functionalized PolyAlkylaryl Ether Dendrimers | Chem. Eur. J. 10, 689-698. |
| **50.** | 2003 | Review: Photoresponsive Liquid Crystals, Suresh Das and Riju Davis | PINSA.2003, 69A, 109-122 |
| **51.** | 2003 | Photocatalytic Degradation of Wastewater Pollutants: Titanium Dioxide Mediated Degradation of Methyl Orange and b-Naphthol Orange | Annali di Chimica.2003, 93, 719-728. |
| **52.** | 2003 | Reversible Photochemical Phase Transition Behaviour of Alkoxycyano Substituted Diphenylbutadiene Liquid Crystals | Chem. Mater. 15, 1057-1063. |
| **53.** | 2003 | Synthesis and Studies of Some Substituted 4-phenyl,4'-azopyridine Containing Hydrogen Bonded Supramolecular Mesogens | Liq. Cryst. 30, 135-141. |
| **54.** | 2002 | Novel Azopyridine-Containing Silver Mesogens; Synthesis, Liquid Crystalline | Chem. Mater. 14, 2687-2692 |

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| | | and Photophysical Properties | |
| **55.** | 2001 | Organo-Based Materials for Photonic Applications, | Metals Materials and Processes. 13, 351-360. |
| **56.** | 2001 | Chiral Nematic Glasses from Novel Hydrogen Bonded Mesogens | Chem. Lett., 752-753. |
| **57.** | 2001 | Intramolecular Charge Transfer and Photochemical Isomerization in Donor/ Acceptor- Substituted Butadienes | J. Phys. Chem. A.105, 4790-4798. |
| **58.** | 2001 | Synthesis and Studies of Some Cholest-5-en-3-ol-(3b) [4-phenylpyridyl]carbonate-Containing Supramolecular Hydrogen-Bonded Mesogens | Liq. Cryst., 28, 259-264. |
| **59.** | 2000 | Synthesis and Photoswitching Properties of Some Cholesterol Based Liquid Crystals, | Mol. Cryst. Liq. Cryst.2000, 450, 125-139. |
| **60.** | 2000 | Triplet Excited State Properties of the Monomers and Aggregate of Bis(2,4,6 - trihydroxyphenyl) squaraine) | J. Phys. Chem. A., 104, 1842-1847 |
| **61.** | 2000 | Syntheses and Spectroscopic Studies of Novel Chlorins With Fused Quinoxaline or Benzimidazole Ring Systems and the Related Dimers with Extended Conjugation, | Tetrahedron. 56, 3353-3364. |
| **62.** | 1999 | Free Radical Induced Oxidation of the Azo Dye Acid Yellow 9: Kinetics and Reaction Mechanism | J. Chem. Soc. Perkin Trans. 1219-1223. |
| **63.** | 1999 | Nonlinear Optical Properties of Some Cholesterol Based Liquid Crystals | Chem. Lett. 10, 1081-1082. |
| **64.** | 1999 | Can H-aggregates Serve as Light Harvesting Antennae? Triplet-Triplet Energy Transfer Between Excited Aggregates and Monomer Thionine in Aerosol-OT System | J. Phys. Chem. B. 103, 209-215. |
| **65.** | 1999 | Controlling Dye (Merocyanine-540) Aggregation on Nanostructured TiO2 Films. An Organized Assembly Approach for Enhancing the Efficiency of Photosensitization | J. Phys. Chem. B, 103, 4693-4700. |
| **66.** | 1999 | Photochemical Behaviour of Anthraquinone Based Textile Dye (Uniblue-A) Bound to Cellulose Powder and Cotton Fabric | Res. Chem. Intermed. 25, 915-924. |
| **67.** | 1999 | Photochemical Phase Transition in Hydrogen Bonded Liquid Crystals | Chem. Mater. 11, 207-208 |
| **68.** | 1998 | 2-Phenyl-3-(5,6,7,7a-tetrahydro-1H,3Hpyrrolo[1,2-c]oxazol-3-ylidene)-l propene-1,1-dicarbonitrile and 4-(4-Methoxyphenyl)-2,6-bis(methylthio)pyridine-3-carbonitrile | ActaCryst. C54, 1033-1036. |
| **69.** | 1998 | Spectral Characterization of the One-Electron Oxidation Product of cis-Bis(isothiocyanito)bis (4,4′-dicarboxylato-2,2′-bipyridyl) Ruthenium(II) Complex Using Pulse Radiolysis | J. Phys. Chem. B.1998, 102, 8954-8957. |
| **70.** | 1997 | Transient Absorption Studies on 3,6-Dibromopolyvinyl¬carbozole and Its | Photochem. Photobiol., A., 106, 135-139. |

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| | | Model Compounds | |
| 71. | 1997 | Phototransformations of Bridgehead-Substituted Dibenzobarrelenes. Steady State and Laser Flash Photolysis Studies of 9-Benzoyl-and (a-hydroxybenzyl)-Substituted Dibenzobarrelenes | J. Photochem. Photobiol., A. 103, 69-73. |
| 72. | 1997 | Photoelectron Transfer Induced Decarboxylation of Substituted Carboxylic acids Across a Liquid/Liquid Interface | Tetrahedron.1997, 53, 16817-16834. |
| 73. | 1997 | Review: Photoinduced Electron Transfer Reactions of Amines. Synthetic Application and Mechanistic Studies | J. S. Dileep Kumar and Suresh Das, Res. Chem. Intermed.1997, 23, 755-800. |
| 74. | 1997 | Photocatalytic Degradation of Waste Water Pollutants: Titanium Dioxide–Mediated Oxidation of a Textile Dye, Acid Blue-40 | Res. Chem. Intermed.1997, 23, 233-246. |
| 75. | 1997 | Squaraine Based Sensor for the Selective Detection of Transition and Other Metal Ions in Aqueous Media | Chem. Commun. 597-598. |
| 76. | 1997 | Picosecond Dynamics of an IR Sensitive Squaraine Dye. Role of Singlet and Triplet Excited States in the Photoionization of TiO2 Nanoclusters | J. Chem. Phys. 106, 6404-6411. |
| 77. | 1997 | Halogenated Squaraine Dyes as Potential Photochemotherapeutic Agents. Synthesis and Study of Photophysical Properties and Quantum Efficiencies of Singlet Oxygen Generation | Photochem. Photobiol.1997, 65, 783-790. |
| 78. | 1997 | Zwitterionic Dye–Based Conducting Polymers. Synthesis and Optical Properties of Pyrrole-Derived Polysquaraines | Chem. Mater.1997, 9, 644-646. |
| 79. | 1996 | Photochemistry of Squaraine Dyes 10. Excited State Properties and Photosensitization Behaviour of an IR Sensitive Cationic Squaraine Dye | J. Chem. Soc. Faraday Trans.1996, 92, 4913-4916 |
| 80. | 1996 | Phototransformations of Bridgehead Disubstituted Dibenzobarrelenes. Interesting Rearrangements of Dibenzosemibullvalene Intermediates Derived from 9-Hydroxyalkyl-10-methoxy Substituted Dibenzobarrelenes | J. Org. Chem., 61, 5468-5473. |
| 81. | 1996 | Aggregation Behaviour of Water Soluble Bis(benzothiazolylidene) squaraine Derivatives in Aqueous Media | J. Phys. Chem. 100, 17310-17315. |
| 82. | 1996 | Photochemistry of Squaraine Dyes: Excited Triplet State and Redox Properties of Crown Ether Squaraines | J. Phys. Chem. 100, 2117-2124 |
| 83. | 1996 | Phototransformations of 9-Ethyl-Substituted Dibenzobarrelene. Oxygen-Trapping of Diradical Intermediates | J. Photochem. Photobiol. A., 95, 137-141. |
| 84. | 1996 | Photoelectron Transfer Catalyzed Reactions of Amines with α, β-Unsaturated Esters and Acrylonitrile Using Different Sensitizers | J. Photochem. Photobiol. A. 97, 139-150. |

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| **85.** | 1996 | Synthesis and Characterization of Some Donor-Acceptor Substituted Butadienes for Second Harmonic Generation | J. Chem. Soc. Perkin Trans. 2, 731-736. |
| **86.** | 1996 | Two Photoproducts Derived From 11,12-Dibenzoyl-9,10-Dihydro-9,10-Dimethoxy-9,10-Ethenoanthracene | Acta. Cryst. C52, 2797-2800. |
| **87.** | 1996 | A Photoproduct Derived from 9-Benzyl-Substituted Dibenzo-barrelene | Acta Cryst. C52, 942-944. |
| **88.** | 1996 | Formation of Lactams via Photoelectron-Transfer Catalyzed Reactions of N-Allylamines with α,β-unstaurated Esters | Tetrahedron 52, 3425 |
| **89.** | 1995 | Crown Ether Derivatives of Squaraine: New Near-Infrared Absorbing, Redox-Active Fluoroionophores for Alkali Metal Recognition | Anal. Proc., 32, 213-215. |
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## Chapters in Books Authored

1. Photoinduced Electron Transfer Reactions of Amines, Acid Chlorides and Carboxylic Acids, Suresh Das, J. S. Dileep Kumar, C. S. Rajesh, D. Ramaiah, K. Shivaramayya, T. L. Thanulingam and M. V. George, New Horizons in Organic Synthesis, V. Nair and Sasikumar (Eds.), Newage Publishers. 1996, 228-235.
2. Photoresponsive Chiral Liquid Crystals, R. K. Vijayaraghavan, Suresh Das, Supramolecular Soft Matter:

Applications in Materials and Organic Electronics, pp.323 – 344, Wiley.

3. Electron Transfer Reactions of Amines, Suresh Das and V. Suresh Chapter 2.1.7 Vol.2 in "Electron Transfer in Chemistry Vol.1-5" V. Balzani and J. Mattay (Eds.), WILEY-VCH, Chapter II, 2001, 379.
4. Photophysical and Photochemical Properties of Squaraines in Homogeneous and Heterogeneous Media, Suresh Das, K. George Thomas and M. V. George Chapter in the book entitled "Molecular and Supramolecular Photochemistry", V. Ramamurthy and K. S. Schanze (Eds.), Marcel Dekker Inc., NY, 1997, 467.
5. Excited State Behaviour of Fullero-Phenylpyrrolidines, P. V. Kamat, D. Guldi, Di Liu, K. George Thomas, V. Biju, Suresh Das and M. V. George, In Fullerenes, K. Kadish and R. Ruoff (Eds.) The Electrochemical Society, Pennington, 1997, 4, 122-128.
6. Aspects of HO2· Elimination Reaction from Organic Peroxyl Radicals: Some Recent Examples, Suresh Das, O. J. Mieden, X.-M. Pan, M. Pepas, M. N. Schuchmann, H. P. Schuchmann, C. von Sonntag and H. Zegota, Oxygen Radicals in Biology and Medicine M. G. Simic, K. A. Taylor, J. F. Ward and C. von Sonntag (Eds.), Plenum Press, NY, 1988, pp.55-58.

## List of Patents

1. **Suresh Das**, R. Davis, (**2005**), Non-visualized permanent information recording substrate for use as a security label for authentication, United States Patent No. 6,951,692.
2. **Suresh Das**, K. G. Thomas, V. Biju, U. Santhosh, V. Suresh, (**2005** and **2002**), Squaraine Based Dyes and Process for Preparation Thereof, German Patent No. DE 10196853 (**2005**) and United States Patent No.6, 417,402 (**2002**).
3. D. Ramaiah, K. T. Arun, **Suresh Das**, B. Epe, (**2004**), Heavier Halogen Atom Substituted Squaraine Based Dyes, Process for the Preparation thereof and use thereof as Sensitizers for Photodynamic, Therapeutical and Industrial Applications, United States Patent No. 6,770,787 B2.
4. **Suresh Das**, Bruno Dufour, Mangalam S. Nair, K. V. Radhakrishnan (**2011**), Photochromic 2H-Chromenes Annelated at C5-C6 and their Methods of Preparation, EP2344469 A1, CN102131793A, EP2344469B1, US8217188, US20100056810, WO2010027418A1.

## Invited Talks (Partial List):

1. Bridging the Innovation Gap, Zaheer Science Foundation Meeting: Conclave of Scientists on Science, Technology and Innovation Policy: Foresight, Growth, Roadmaps, Sectoral Impact Assessment and Alliances: 27-29th November 2014, INSA, New Delhi.
2. Panel Discussion:Exploring Frontiers of Interdisciplinary Research– Developments, Discoveries & Future Potential, Global R&D Summit, FICCI November 12-13, 2014, New Delhi
3. Photoresponsive Materials, International conference on Advancements in Materials, health and Safety towards Sustainable Energy and Environment (MHS2014), August 7-8, 2014, Chennai, ( IJAA, JSPS, AERB, BNERC)
4. Photoresponsive Materials, National Conference on Materials Science and Technology – 2014, Indian Institute of Space Technology-Trivandrum.
5. Ambipolar Compounds for Optoelectronic Applications: 25th Annual General Meeting of MRSI, 12-14 February2014, Indian Institute of Science, Bangalore
6. Photoresponsive Materials, Indo-French Symposium on Functional Metal-Organics: Applications in Materials and Catalysis, NISER, Bhubaneswar, February 24-26.
7. Exploring the Role of Self-Assembly in the Design of Organic Photofunctional Materials, MRSI-AGM-2013, IGCAR-Kalpakkam.
8. Photoresponsive Materials: Indo-US Workshop (IUSWNM-2013) at Thrissur
9. "Photoresponsive Soft Materials", 7th Asian Photochemistry Conference at Osaka University, Japan, November11-20, 2012 (Asian and Oceanian Photochemistry Association (APA) Award lecture).
10. Photophysical Properties of Organic Materials: Role of Molecular Aggregation; Eigth JNC Conference on Chemistry of Materials, Trivandrum, September 30- October 2, 2012.
11. Photoresponsive Soft Materials, International Conference on Recent Trends in Advanced Materials,

ICRAM-2012, VIT University, Vellore.

12. "Hierarchical Self-Assembly of Stilbene and Butadiene derivatives into Luminescent Organogels", Indo-French seminar Self-Assembled Hybrid Systems: Advanced Materials for the Future, March 2-4, 2011, Travancore Heritage Resort, Thiruvananthapuram, Kerala, INDIA
13. "Photophysical Properties of Organic Materials: Role of Molecular Aggregation" 12th Jawaharlal Nehru Centre for Advanced Scientific Research National Research Conference on Chemistry of Materials "Photoresponsive soft materials from block copolymers", Meeting on "Chemistry and Physics of Advanced Materials", held at Vedic Village, October 28-30, 2011, Kolkata, India
14. "Photoresponsive Soft Materials", 9th CRSI National Symposium in Chemistry held at University of Delhi, 01-04, February, 2007.
15. "Butadiene Based Photoresponsive Materials", Indo-French Workshop on Organic Photonic Components and Devices, February 02-06, 2004, Cochin, Kerala, India
16. "Push-Pull Butadienes: Photochemical and Material Properties", Trombay Symposium on Radiation and Photochemistry, BARC, Bombay, January 08-12, 2004.
17. "Photoresponsive Materials and Photochemistry of Vision", Workshop on Lasers and Applications in Chemical Processes, National Centre for Ultrafast Processes, University of Madras (Organized by Indian National Science Academy) January 19-31, 2004, Chennai, India
18. "Photochemistry of Squaraine Dyes and Dye Aggregates", Osaka Prefecture University, Sakai, Japan, July 31, 2003
19. "Push-Pull Butadienes: Photochemical and Material Properties", National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan (July 22, 2003)
20. "Push-Pull Butadienes: Photochemical and Material Properties", Kyoto Institute of Technology, Kyoto, Japan (August 03, 2003)
21. "Push-Pull Butadienes: Photochemical and Material Properties", Mie University, Mie, Japan (August 05, 2003)
22. "Push-Pull Butadienes: Photochemical and Material Properties", Chiba University, Chiba, Japan (August 07, 2003)
23. "Butadiene Based Photoresponsive Materials", Pfizer Endowment Symposium in Organic Chemistry held at Indian Institute of Science, Bangalore, December 19, 2002.
24. "Photoresponsive Liquid Crystals", Recent Advances in Chemical Sciences (RACS – 2002), held at Mahatma GandhiUniversity, Kottayam, December 18-20, 2002.
25. "Photocatalytic Degradation of Wastewater Pollutants: Titanium Dioxide Mediated Degradation of Methyl Orange and Naphthol Orange", Indo-Italian Workshop on Emerging Technologies for Industrial Waste Water Treatment and Environment, Organized by National Environmental Engineering Research Institute (NEERI), CSIR, Nagpur, Maharashtra, September 2-4, 2002.
26. "Photocatalytic Properties of Titanium Dioxide", National Seminar on Challenges of Titanium Industry in India, organized by Travancore Titanium Products Ltd., Trivandrum, Kerala, April 19-20, 2002.
27. "Photochemical and Photophysical Properties of Squaraine Dyes", Indian Institute of Technology, Mumbai, February 5, 2002.
28. "Photoactive Mesogens: Design and Study of Their Liquid Crystalline and Photoswitching Properties", Tata Institute of Fundamental Research, Mumbai, February 4, 2002.
29. "Excited State Properties of Squaraine Dye Aggregates", Japanese Photochemistry Annual Meeting and One -day International Symposium on the 21st Century Photochemistry held at Kanazawa City Hall, Kanazawa, Japan, September10-13, 2001.
30. "Donor/Acceptor Substituted Butadienes", Asian Photochemistry Symposium held at BARC, Mumbai, January1, 2002.
31. "Photoactive Mesogens: Design and Study of Their Liquid Crystalline and Photoswitching Properties", National Symposium on Photochemistry and Photobiology held at Indian Association for the Cultivation of Science, Calcutta, January 24, 2002.
32. "Photochemistry of Squaraine Dyes", Symposium held at Madurai Kamaraj University, Madurai, Tamil Nadu January 17, 2002.
33. "Photoactive Liquid Crystals: Design and Study of Their Photoswitching and Nonlinear Optical Properties", Eighth NOST Symposium held at Hotel Ashok, Jaipur, Rajasthan, March 2-5, 2000.
34. "Excited State Properties of Dye Aggregates", Second National Symposium in Chemistry, Held at IICT, Hyderabad, January 27-29, 2000.
35. "Excited State Properties of Dye Aggregates", Trombay Symposium on Radiation and Photochemistry, held

at Bhabha Atomic Research Centre, Trombay, Mumbai, January 12-17, 2000.

36. "Photochemistry of Dye Aggregates in Homogeneous and Heterogeneous Media" Seminar on Ultrafast Processes in Biology, Chemistry and Physics, National Centre for Ultrafast Processes, Department of Inorganic Chemistry, School of Chemical Sciences, University of Madras, Guindy Campus Chennai, March 11-13, 1999.
37. "Excited State Properties of Dye Aggregates in Homogeneous and Heterogeneous Media", National Symposium on Radiation and Photochemistry, Sambalpore University, Orissa, February 15-17 1999.
38. "Electron Transfer Across Interfaces", Department of Chemistry, Tulane University, New Orleans, USA, October 10, 1998.
39. "PhotoinducedElectron Transfer at Interfaces" 1st International Workshop on Environmental Photochemistry, Photoenergy Center, Ain Shams University, Cairo, Egypt in co-operation with the Department of Chemistry, The University of Winnipeg, Canada, December 17-22, 1997.
40. "Photochemical Processes in Biomedical Photosensitization and Photodynamic Techniques in Sterilization of Water", Applications of Photodynamic Technology in Health Care, Organized by Institute for Nuclear Medicine and Allied Sciences, New Delhi, December 1-3, 1997.
41. A Brief Overview of Some of the Current Research Activities of the Photochemistry Research Unit, of the Regional Research Laboratory, Trivandrum, Workshop on National Centre for Ultrafast Process-ChennaiUniversity of Madras, November 28, 1997.
42. "Excited State Properties of Squaraine Aggregates", National Seminar on Molecular Dynamics and Structure, Indian Institute of Technology, Madras, April 5-6, 1996.
43. "Organic Non-linear Optical Materials", Materials Research Society of India Meeting, Regional Research Laboratory, Trivandrum, April 4, 1996.
44. "Photochemistry of Homogeneous Electron Transfer Catalytic Systems: Synthetic Applications and Mechanistic Studies", 5th NOST Symposium, Tirupati, December 18-19, 1995.
45. "The Formation, Photodissociation and Photosensitizing Properties of SquaraineAggregates", Symposium on Radiation and Photochemistry, Bhabha Atomic Research Centre, Bombay, January 17-21, 1994.
46. "Photochemistry of Electron Transfer Catalytic Systems: Synthetic Applications and Mechanistic Studies", UNIDO-ICS Training Course, IISc, Bangalore, December 8-18, 1993.
47. "Molecular Devices: Electronic and Photonic Effects at the Molecular Level" Technology Advisory Board Meeting of the Chemical Sciences (CSIR), CECRI, Karaikudi, August 22, 1992.
48. "Photophysical and Photosensitization Properties of Squaraine Dyes" Symposium on Radiation and Photochemistry, held at the Bhabha Atomic Research Centre, Bombay, January 27-31, 1992.
49. "Nonlinear Optical Materials" Discussion Meeting: Organic Chemistry: Future Directions, held at the Jawaharlal Nehru Centre for Advanced Scientific Research, IISc, Bangalore, February 20-22, 1992.

## Doctoral Thesis Supervised

1. Dr. S. Ajayakumar
   **Ph. D. thesis**: Phototransformations of Bridgehead Substituted Dibenzobarrelenes and Related Systems
2. Dr. J. S. Dileepkumar
   **Ph. D. thesis**: Photoelectron Transfer Catalyzed Reactions of some Amines: Synthetic Applications and Mechanistic Studies
3. Dr. K. J. Thomas
   **Ph. D. thesis:** A Study on the Metal Ion Sensing Ability and Aggregation Behavior of some Squaraine Dyes
4. Dr. C. S. Rajesh
   **Ph. D. thesis:** Photoelectron Transfer Catalytic Systems for the Generation of Acyl and Alkyl radicals: Synthetic Applications and Mechanistic Studies
5. Dr. Mathew George
   **Ph. D. thesis:** Organic Materials for Nonlinear Optics : Synthesis and Photophysical Studies of some Donor-Acceptor Substituted Molecules
6. Dr. V. Suresh
   **Ph. D. thesis:** Development of Functional Dye Materials: Synthesis and Study of some Dyes containing

Ruthenium Polypyridyl and Squaraine Chromophores.

7. Dr. U. Santhosh
   **Ph. D. thesis:**: Excited State Electron and Energy Transfer in someSquaraine Dyes and their Aggregates

8. Dr. V. Ajaya Mallia
   **Ph. D. thesis:** Some Novel Hydrogen Bonded Supramolecular Liquid Crystals: Synthesis and Study of Liquid Crystalline and Photochemical Properties

9. Dr. Riju Davis
   **Ph. D. thesis:** Novel Donor-Acceptor Substituted Butadiene Systems: Photochemical and Photophysical Properties in Solution, Liquid crystalline and Crystalline Phases

10. Dr. P. K. S. Antharjanam
    **Ph. D. thesis:** Design, Synthesis and Study of Liquid Crystalline and Photophysical Properties of some Silver containing Mesogens

11. Dr. Saji Alex
    **Ph. D. thesis:** Design and Study of some Novel Squaraine based Sensitizers and Sensors

12. Dr. Shibu Abraham
    **Ph. D. thesis:** Synthesis and Studies of Novel Donor-Acceptor Substituted Butadiene Systems

13. Dr. M. C. Basheer
    **Ph. D. thesis:** Design and Synthesis of Some Novel Squaraine Based Near Infrared Sensitizers and Probes

14. Dr. G. Narayan
    **Ph. D. thesis:** Photoactive Mesogenic Sugars: Synthesis, Liquid Crystalline and Photochemical Properties

15. Dr. N. S. Saleesh Kumar
    **Ph. D. thesis:** Synthesis, Photophysical and Liquid Crystalline Properties of Some Butadiene Based Mesogens

16. Dr. Shinto Varghese
    **Ph. D. thesis:** Exploring Self-Assembled Stilbenoid Architectures in the Pathway from Molecules to Materials

17. Dr. Ratheesh K. V.
    **Ph. D. thesis:** Design, Synthesis and Study of Photoresponsive Liquid Crystals and Investigation of Light Emitting Properties of their Solid and Liquid Crystalline Phases

18. Dr. Sajith Menon
    **Ph. D. thesis:** Design, Synthesis and Study of the Self Assembling and Photochemical Properties of Some Light Responsive Amphiphilic Block Copolymers

19. K. M. Shafeekh
    **Ph. D. thesis:** Synthesis of Some Novel Squaraine Dyes and Exploration of their Application as Sensors and Sensitizers

20. Deepak D. Prabhu
    **Ph. D. thesis:** Design, Synthesis and Study of Photophysical and Self-assembling Properties of Some $C_3$-Symmetric Donor-Acceptor Molecules

21. Moochikkadavath A. Rahim
    **Ph. D. thesis:** Design, Synthesis and Study of Some Novel Squaraine Dyes for Applications in Solar Cells

22. Aneesh P. S.
    **Ph. D. thesis:** Synthesis and study of the self-organization properties of angular π-conjugated molecules possessing columnar order

23. Rahul Ongungal
    **Ph. D. thesis:** Design, synthesis, study of the self-assembling and luminescent properties of some 1,3,4-oxadiazole and 2,1,3-benzooxadiazole derivatives

24. Shimi Manchery