

Ayyappanpillai Ajayaghosh

Brief Biography:

Ajayaghosh, currently S. S. Bhatnagar Chair Professor, SRM Institute of Science and Technology, Kattankulathur, Chennai, is the former Director of CSIR-NIIST and a J. C. Bose National Fellow at CSIR-NIIST, Thiruvananthapuram, India. He obtained masters and Ph. D. in chemistry from Calicut University. His research interests are in the areas of organic materials such as fluorescent materials, photoresponsive materials, organogels, molecular probes, covalent organic frameworks etc. He introduced a new class of soft materials namely pi-gels and studied the fundamental science behind the creation of such



materials, which was widely accepted by the scientific community. His research findings and publications are well cited with around 20000 citations with an h-index of 70 (Google citations).

His research contributions are recognized with several prestigious awards including the **Shanti Swarup Bhatnagar Prize for Chemical Sciences (2007)**, the **Infosys Science Prize (2012)**, **Khwarizmi International Award 2012**, the **Silver Medal of the Chemical Research Society of India (2013)**, the **TWAS Prize for Chemistry 2013** and the **Goyal Prize (2019)**. He was a **Swarnajayanti Fellow** and **Ramanna Fellow** of the DST, Govt. India and a **DAE Outstanding Researcher**. He is a recipient of The Thomson Reuters India Research Front citation award and the Clarivate Analytics (Web of Science) citation award. He is a **Fellow of the three major Science Academies of India, an honorary fellow of the Kerala Academy of Sciences and a fellow of the World Academy of Sciences. Currently, he is a J. C. Bose National fellow of the DST-SERB, Govt. India.**

Ajayaghosh is in the editorial board of several international and national journals. During 2013-2019 he served as an Associate Editor of PCCP (RSC Journal). Currently, he is a senior editor of the Bulletin of the Chemical Society of Japan and in the Editorial/Advisory Boards of Accounts of Chemical Research, Chemical Science, Chemistry –An Asian Journal, RSC Advances, Physical Chemistry Chemical Physics, Langmuir, ChemPhotoChem, and ACS Omega.

He has published 201 peer reviewed research papers, contributed to six book chapters and granted/filed 28 patents. Some of his patents have been sold to industries. He has mentored 37 researchers for Ph.D. and more than 100 students for their master thesis. He has been a plenary or invited speaker to many national and international conferences and has delivered more than 300 scientific lectures. Ajayaghosh has published the highest number of research papers in the journal Angewandte Chemie by an Indian scientist and his author profile has been featured in the same journal. He is the first chemist to receive the Infosys prize for physical sciences.

He has been helping academic institutions and Government agencies in the country by being in the selection committee, research council, board of studies and governing bodies. He has been keenly interested in mentoring and motivating young scientists and students, several of them are faculties in academic and research institutions in India and abroad.

Ajayaghosh has proved his leadership quality at various levels in CSIR. He has a rich experience of research and administration for over three decades in CSIR-NIIST at various levels as a scientist, project leader, Head of the Section, Head of the Division, as Dean of AcSIR and as the Director.

As the Director, Ajayaghosh lead CSIR-NIIST as one of the top performing publically funded R&D institutes in the country. Several industrially and socially relevant research projects have been completed and commercialized under his leadership. He mentored a large number of young colleagues who are currently active researchers and leaders in their respective research areas in India and abroad.

In addition to the research and administrative contributions, Ajayaghosh has been actively involved in science education, science popularization, science awareness programmes, organising conferences, workshops etc. He is passionate to give motivational science lectures to students of rural villages, government schools and colleges.

Infosys Science Prize 2012: Jury Citation

Dr. Ajayaghosh has done landmark work that has advanced supramolecular chemistry, most especially in investigations that have led to the design and synthesis of molecular assemblies called organogels (pi-gels), a new class of materials with great potential for photonic and electronic applications. He has demonstrated that these self-assembled nanomaterials can be used to control the electronic energy transfer processes, paving the way for the development of superior light harvesting devices. He has synthesized and characterized nanomaterials that can be employed in organic electronic devices and in optical sensors to detect tiny amounts of TNT and many other biologically relevant substances.

Curriculum Vitae

Ayyappanpillai Ajayaghosh, FASc., FNASc., FNA, FTWAS
S. S. Bhatnagar Chair Professor, SRM Institute of Science and
Technology, Kattankulathur, Chennai 603 203

Email: ajayagha@srmist.edu.in

J. C. Bose National Fellow

Former Director

CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-
 NIIST)

Thiruvananthapuram 695 019

E-mail: ajayaghosh62@gmail.com; ajayaghosh@niist.res.in

Personal Details:

Date and place of birth : July 30, 1962, Quilon, Kerala

Nationality : Indian

Marital Status : Married (Two children)

Name of Spouse : Ambili Ajayaghosh

Present Position : J C Bose National Fellow

Residence : Devadaru, TC 55/191, Kuttikkadu Lane
 Kaimanam, Pappanamcode P. O.
 Thiruvananthapuram 695 018, India
 Phone: +91 471 2491 592

Academic Details:

DEGREE	YEAR	UNIVERSITY	CLASS	SUBJECT
B.Sc.	1982	Kerala	First	Chemistry
M. Sc.	1984	Calicut	First	Chemistry
Ph. D.	1990	Calicut	Best Thesis	Chemistry

Employment Record:

1. **Scientist B** at the Photochemistry Research Unit, Regional Research Laboratory, Thiruvananthapuram from March 07, 1988 to March 06, 1991.
2. **Scientist C** at the Photochemistry Research Unit, Regional Research Laboratory, Thiruvananthapuram from March, 07, 1991 to March 06, 1996.
3. **Senior Scientist** at the Photochemistry Research Unit, Regional Research Laboratory, Thiruvananthapuram from March, 07, 1996 to December 31, 2000.
4. **Principal Scientist** at the Photosciences and Photonics Group, CSIR-NIIST, Thiruvananthapuram from January, 01, 2001 to December 31, 2004.
5. **Senior Principal Scientist** at the Chemical Science and Technology Division, CSIR-NIIST, Thiruvananthapuram from January 2005 - March 2008.
6. **Senior Principal Scientist with Special Pay/ Professor** at the Chemical Science and Technology Division, CSIR-NIIST, Thiruvananthapuram from April 2008 - December 2009.
7. **Chief Scientist/ Professor** at the Chemical Science and Technology Division, CSIR-NIIST, Thiruvananthapuram from January 2010 - June 2010.
8. **Outstanding Scientist (Scientists H)/ Outstanding Professor and Dean** at CSIR-NIIST, Thiruvananthapuram from July 2010 – June 2015.
9. **Director/ Outstanding Professor** at CSIR-NIIST, Thiruvananthapuram from June 2015– 31 July 2022.
10. **J. C. Bose National Fellow and Outstanding Professor of AcSIR** at CSIR-NIIST, Thiruvananthapuram from August 01, 2022 till-date.
11. **S. S. Bhatnagar Chair Professor**, Dept. of Chemistry, SRM Institute of Science and Technology, Kattankulathur, Chennai 603 203

Research Experience

35 Years of research experience in the area of organic materials at the National Institute for Interdisciplinary Science and Technology (NIIST), CSIR, Thiruvananthapuram (1988 - to-date).

Academic/Teaching Experience

Visiting Faculty, University of Tsukuba, October-December 2004

Adjunct Professor, IIT Kanpur 2002-2008

Visiting Professor, University of Osaka, July-September 2007

Professor (Outstanding), AcSIR 2010-till date

Dean, Chemical Sciences, AcSIR 2010-2017

Adjunct Professor, IISER Thiruvananthapuram January 2023- till date.

Administrative Responsibilities:

1. **Head of the section**, Photosciences and Photonics, CSIR-NIIST, 2007-09
2. **Head of the department**, Chemical Sciences and technology Division, 2009-11
3. **Director-in-charge**, CSIR-NIIST, several occasion during 2010-2014
4. **Dean, Chemical Sciences, AcSIR**, 2011- July 2017
5. **Director**, CSIR-NIIST, June 2015-July 2022

Major Awards

1. **Young Scientist Medal (1988)**, by the Indian Science Congress Association, India.
2. **INSA Young Scientist Medal (1991)**, by the Indian National Science Academy, New Delhi.
3. **CRSI Bronze Medal (2002)**, by the Chemical Research Society of India.
4. **MRSI Medal (2007)**, by Material Research Society of India.
5. **Shanti Swarup Bhatnagar Prize (2007)**, awarded by CSIR, Govt. India.
6. **DAE Outstanding Researcher Award (2009)**, awarded by Dept. Atomic Energy, Govt. India.
7. **Thomson Reuters Research Excellence-India Research Front Award (2009)**.
8. **The Infosys Prize for Physical Sciences 2012** by Infosys Science Foundation.
9. **Khwarizmi International Award 2012** by Iranian Organisation for Science and Technology.
10. **Swadeshi Innovation Award 2012** by the Swadeshi Science Movement, Kerala.
11. **Sri Vidyadhiraja Samskrithi Puraskaram 2013** by Panmana Ashram, Quilon, Kerala.
12. **CRSI Silver Medal 2013** by Chemical Research Society of India.
13. **TWAS Chemistry Prize 2013** by The World Academy of Sciences, Trieste, Italy.
14. **ISAS National Award for Excellence in Science and Technology 2014** by Indian Society of Analytical Scientists.
15. **CHEMTECH CEW Award 2015** for Leadership and Excellence in Research and Development.
16. **J. C. Bose National Fellowship, 2015**, DST, Govt. India.
17. **Web of Science-India Research Excellence-Citation Award 2017** by Clarivate Analytics.
18. **MRSI Distinguished Lectureship Award, 2019-20**, by Materials Research Society of India.
19. **Goyal Prize for Chemical Science, 2019**, by Kurukshetra University.
20. **Kairali Award for Lifetime Contributions in Science**, by Govt. Kerala 2022.

Other Honors

1. **Certificate of Merit (1987)** from the Indian Chemical Society for the best paper presentation, at the Convention of Chemists, 1987
2. **Special Award and Citation (1988)** of the Syndicate of Calicut University, Kerala, India for outstanding research contributions during 1985-1988
3. **Swarnajayanti Research Grant (2001)**, Special research grant to outstanding young researchers by DST, Govt. India
4. **Ramanna Fellow, DST (2007)**
5. **Adjunct Professor**, Material Science Programme, IIT, Kanpur
6. **Dean**, Chemical Sciences, Academy of Scientific and Innovative Research (AcSIR)
7. **A. V. Rama Rao Foundation Award Lecture** of JNCASR, Bangalore (2012)
8. **R. A. Mashelkar Endowment**, NCL Pune (2012)
9. **Chair on Nanoscience and Nanotechnology**, Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, Kerala, 2013
10. **Prof. K. K. M. Yusuff Endowment**, Cochin University of Science and Technology, 2013
11. **CHEMCON** distinguished speaker award, 2016.
12. **ISCB-2017** Award given by Indian Society of Chemists and Biologists.

Academy Fellowships

1. **Fellow, Indian Academy of Sciences, Bangalore (2006)**
2. **Fellow, National Academy of Sciences, Allahabad, India (2011)**
3. **Fellow, Indian National Science Academy, New Delhi (2012)**
4. **Honorary Fellow, Kerala Academy of Sciences (2013)**
5. **Fellow, Royal Society of Chemistry, London (2014)**
6. **Fellow, The world Academy of Science (2015)**

Research Fellowships

1. **INSA-JSPS Exchange Fellow (1993)**, Chiba University, Japan during Aug.1993 Dec.1993
2. **Alexander von Humboldt Fellow (1994)**, Max-Planck-Institut für Strahlenchemie, Germany, August 1994-February 1996
3. **DST-DAAD Exchange Fellow (2001)**, University of Regensburg, Germany
4. **INSA-JSPS Exchange Fellow (2003)**, AIST Tsukuba, Japan during July-Sept.2003

Past and Present Editorial Assignments

1. **Editorial board member**, Resonance, 2003 (Term completed)
2. **Editorial Board Member**, J. Chem. Sci. (Indian Academy of Science) (Term completed)
3. **International Editorial Advisory Board Member**, ACS Applied Materials & Interfaces (Term completed)
4. **International Editorial Advisory Board Member**, Chemistry – An Asian Journal (Term Completed)
5. **Associate Editor, Physical Chemistry Chemical Physics**, Royal Society of Chemistry 2012-2018.
6. **Editorial Advisory Board Member**, RSC Advances, Royal Society of Chemistry
7. **Senior Editor**, Bulletin of the Chemical Society of Japan (ongoing)
8. **Editorial Adviosry Board Member**, Accounts of Chemical Research, American Chemical Society (January 2016-December 2022)
9. **Editorial Board Member**, Chemistry – An Asian Journal, Wiley-VCH (2016-Ongoing)
10. **Editorial Board Member**, ChemPhotoChem, Wiley-VCH (2018-Ongoing)
11. **Editorial Advisory Board Member**, Chemical Science, Royal Society of Chemistry (2019-Ongoing)
12. **Editorial Advisory Board Member, Physical Chemistry Chemical Physics**, Royal Society of Chemistry (2018-Ongoing)
13. **Editorial Advisory Board Member**, ACS Omega, American Chemical Society (2018 - Ongoing).
14. **Editorial Advisory Board Member**, Langmuir, American Chemical Society (January 2019-December 2022).
15. **Editorial Advisory Board Member**, ACS Central Science, American Chemical Society (January 2020-Ongoing).

Membership in Academic and Research Advisory Boards

1. **Member, Board of Post-Graduate Studies in Chemistry (2001-2003)**, Mahatma Gandhi University, Kottayam, India (Completed)
2. **Member**, Board of Studies, Chemistry, CUSAT, Kerala (Completed)
3. **Chairman**, Board of Studies in Nanoscience and Technology, Univ. Kerala (Completed)
4. **Member, Research Council**, CSIR-North East Institute of Science and Technology, CSIR, Jorhat (2008-2010, Completed)
5. **Member, Research Council**, CSIR-NCL, Pune (Completed)
6. **Council Member**, Indo-French Centre for Promotion of Sciences (CEFIPRA)

7. **Member, Director Board**, Asian Nanoscience and Nanotechnology Association, Japan
8. **Member, Governing Board**, Sreenivasa Ramanujan Institute of Basic Sciences, Kottayam, Kerala
9. **Council member**, Chemical Research Society of India
10. **Member, Research Council**, CSIR-Indian Institute of Petroleum, Dehradun
11. **Sectional committee member**, chemical sciences, Indian Academy of Sciences, Bengaluru
12. **Sectional committee member**, chemical sciences, Indian National Science Academy, New Delhi
13. **Member, Research Council**, CSIR-NCL, Pune
14. **Member, Board of Management**, IIST, Thiruvananthapuram
15. **Member, State Council**, Kerala State Council for Science, Technology & Environment (KSCSTE)
16. **Member, Oversight Committee**, SERB, DST
17. **Member, Senate**, Academy of Scientific & Innovative Research
18. **Member**, PURSE committee, SERB, DST
19. **Member**, Board of Governors, AcSIR
20. **Member**, Board of Governors, INST, Mohali
21. **Member**, SATHI committee, SERB, DST
22. **Member**, Research Council, SRM University

Association with Professional Bodies

1. Life member, Chemical Research Society of India (2000 onwards)
2. Life member, Materials Research Society of India (2002 onwards)
3. Life member, Society for Polymer Science, India (2002 onwards)
4. Vice-president, Society for Polymer Science, India Trivandrum Chapter (2012-2015)
5. President, Society for Polymer Science, India Trivandrum Chapter (2015-2018)
6. National Vice-president, Society for Polymer Science India (2019-2022)

Research Interests

1. **Macromolecular Chemistry** : (Polymer-based sensors, Conducting polymers, Low band gap polymers, Light emitting polymers)
2. **Functional Organic Materials** : (Organic dyes, Light emitting materials, Molecular sensors and probes, COF)
3. **Supramolecular Chemistry** : (Molecular self-assembly, Organogels, Nanostructures)

Brief Description of Research Contributions and Scope of the Work:

One of the grand challenges in chemistry, in the 21st century, is to understand the role of relatively weak noncovalent interactions in the construction of functional supramolecular architectures. Ajayaghosh has made original contributions in advancing the field of supramolecular chemistry, especially in the design and synthesis of molecular assemblies called pi-gels, a new class of materials formed out of organic pi-systems with great potential for photonic, electronic and security applications. These cleverly designed molecules self-assemble to nanoscale supramolecular architectures through hydrogen bond / aromatic-aromatic attractive interactions. Dr. Ajayaghosh was the first investigator to make functional pi-gelators designed from linear pi-systems as building blocks. He has shown that these self-assembled nanomaterials can be used as a soft scaffold to control electronic energy transfer processes, paving the way for the development of superior light harvesting devices. His 2001 paper in the journal of the *American Chemical Society (J. Am. Chem. Soc. 2001, 123, 5148-5149)* cleared the way for systematic exploration and exploitation of the properties of these designer organogels. He built on this early work in the construction of aesthetically appealing but functionally useful nanomaterials that can be used for energy conversion and in optical sensors to detect tiny amounts of TNT and many other organic molecules of relevance. He is a leader in this exciting new area of materials chemistry. He has been recognised both nationally internationally for his research contributions in the field of molecular assemblies and soft materials. His publications are well cited in the literature. He has been an invited speaker to many national and international conferences. He has motivated a large number of young researchers in the country and abroad and many of them are working on similar topics.

Infosys Prize Jury Citation:

Dr. Ajayaghosh has done landmark work that has advanced supramolecular chemistry, most especially in investigations that have led to the design and synthesis of molecular assemblies called organogels (pi-gels), a new class of materials with great potential for photonic and electronic applications. He has demonstrated that these self-assembled nanomaterials can be used to control the electronic energy transfer processes, paving the way for the development of superior light harvesting devices. He has synthesized and characterized nanomaterials that can be employed in organic electronic devices and in optical sensors to detect tiny amounts of TNT and many other biologically relevant substances.

Research Supervision

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| 1. | M. Sc. Students Trained | : 100 |
| 2. | Ph. D. Awarded | : 37 |
| 3. | Ph. D. Ongoing | : 07 |

Major Projects Handled

1. DST project entitled "Organic Dye Based Macromolecular Electronic Conductors, Receptors and Noncovalent Assemblies: Synthesis and Properties of Novel Materials Derived from Oligo- and Polysquaraines." 1998-2001
2. DST project entitled "Crafting of Macromolecular Materials from Supramolecular Assemblies", under the Swarnajayanti scheme, 2001-2006.
3. DST project entitled "Chiral π -Electronic Gels and Helical Nanostructures: Self-Assembly of Conjugated Molecules to Photoactive Organic Materials" under invited category, 2004-2007.
4. Ramanna Fellowship programme entitled as "Photoactive Supramolecular Architectures: Design and Applications", 2006-2009.
5. DST project entitled "Functional nanomaterials of π -Conjugated Molecules", under the DST Nanoscience and Technology Initiatives, 2007-2010.
6. Indo-French project entitled, "Functional Hybrid Nanomaterials of Polymeric Gels and π -Conjugated Self-assemblies", supported by CEFIPRA, New Delhi, 2007-2010.
7. "Energy Efficient Organic Materials" CSIR Network programme, 2007-2012.
8. "Molecular and Supramolecular Architectures with Optoelectronic Functions", DAE, 2009-2014.
9. DBT project entitled "Detection of Zinc in Epileptic Condition Using Ratiometric Fluorescent Molecular Probes", 2013-2016.
10. DST-AISRF Project entitled "Large area optoelectronics for India and Australia from Materials to Advanced Devices", 2018 (on going).
11. DST-JSPS Project entitled "Construction of p/n Heterojunction through the Self-assembly of Functional Dyes", 2018.
12. DST-SERB Core Research Grant (Special Call PAC Organic Chemistry), Project entitled "Design and Development of Efficient, Stable and Cost Effective Organic Dyes and its Application in Dye-Sensitized Solar Cells", 2019.
13. DST-SERB J. C. Bose National Fellowship project entitled "Fluorescent Molecules and Assemblies for Sensing and Imaging" 2015 (IInd term on going).

Invited Talks: Approximately 350 (These include invited lectures and plenary talks in various national and international conferences).

Recent Plenary Talks in Conferences:

1. Squaraines as molecular probes and self-assembly modules, East Asia Symposium on Advanced Materials and Functional Dyes, Osaka, Japan, June 2-6, 2009.
2. Self-assembled soft materials with tunable properties, International Conference on Materials for the Millennium (MATCON 2010), Kochi, India, January 11-13, 2010.
4. The chemistry and applications of self-assembled functional molecules, Kuwait Conference of Chemistry, Kuwait, March 6-9, 2010.
5. Self-assembled Soft Materials with Tunable Fluorescence and Their Application in Imaging, International Conference on Materials Science and Technology (ICMST 2010), Trivandrum, November 28-30, 2010.
6. Rationally Designed Molecular Probes for Analyte Sensing. International Analytical Science Congress, Kochi, November 24-27, 2010.
7. Fluorescent Noncovalent Macromolecular Architectures and Organogels from Thermal Imaging, Macro 2010, International Conference on Polymer Science and Technology, New Delhi, December, 14-17, 2010.
8. Superhydrophobic CNT Nanocomposites of Molecular Self-assemblies, Cochin Nano, International Conference on Nanoscience and Technology, Kochi, August 14-17, 2011.
9. New Fluorophores for Analyte Sensing and Bioimaging, 5th East Asia Symposium on Functional Dyes and Advanced Materials, Hanzhou, China, September 25-29, 2011.
10. Self-assembled Organic Nanostructures, International Conference on Nanomaterials (ICN 2012), MG University, Kottayam, India, January 13-14, 2012.
11. New Fluorophores for Analyte Sensing, Cell Imaging and Protein Labeling, Indian Analytical Science Congress, Kanyakumari, India, January 27-28, 2012.
12. R. A. Mashelkar Endowment Lecture, NCL Pune, August 13, 2012.
13. Supramolecular Polymerization of Fluorescent π -Systems and Their Properties, PolyTech 2012, Pune, December 15-17, 2012.
14. Molecular Assemblies with Diverse Architectures and Exceptional Properties, Chennai Chemistry Conference, CSIR-CLRI, February 8-10, 2013.
15. Molecular Assemblies in Energy, Environment and Health, Indian Society for Analytical Scientists Conference, Goa, August 15-17, 2013.
16. Molecular Aggregates and Hierarchical Assemblies of π -Systems, 5th ACCIS, North Bengal University, Darjeeling, November 21-23, 2013.
17. The Power of Fluorescent Molecular Assemblies, ICANN 2013, IIT Guwahati, December 1-3, 2013.

18. Photoresponsive Supramolecular Assemblies and Gels, Conference on Light in Chemistry, Materials and Biology, IIT Khragpur, February 24-25, 2014.
19. The Azobenzene Photoswitch and Supramolecular Chirality, Asian Photochemistry Conference, Trivandrum, November 10-14, 2014.
20. Excited State Properties of Supramolecular Polymers and Organogels, 10th International Polymer Conference, Society for Polymers Science Japan, Tsukuba, Japan, December 2-5, 2014.
21. Electronic Properties of Thiophene Based Supramolecular Polymers and Organogels, Macro 2015, IACS, Kolkata, January 23-26, 2015.
22. Organic Semiconductor Assemblies for Energy Efficient Devices, IC-EEE, CUSAT, Kochi, February 4-6, 2015.
23. Linear-Systems Based Supramolecular Polymers and Hybrid Materials, APM 2015, IISc, Bangalore, February 19-21, 2015.
24. Nanoarchitectures by Molecular Assembly: A Case of a Self-cleaning Material, Nanoscience and Nanotechnology, Kerala University, Thiruvananthapuram, March 19-20, 2015.
25. Molecular Self-assembly and Self-cleaning Materials, National Conference on Smart Materials, Calicut University, March 24-25, 2015.
26. Fluorescent Molecular Assemblies for Sensing and Imaging, RAINSAT 2015, Sathyabhama University, Chennai, July 8-10, 2015.
27. Fluorescent Molecular Assemblies for sensing and imaging, ICNDC 2015, BITS Pilani, October 16-18, 2015.
28. Stimuli Responsive Fluorescent Molecular Assemblies, Challenges in Organic Materials and Supramolecular Chemistry (RSC ISACS 18), November 19-21, 2015.
29. Stimuli Responsive Fluorescent Molecular Assemblies, ICNEECS-15, Madurai Kamraj University, December 10-11, 2015.
30. Mimicking Natural Self-cleaning Property with Artificial Materials, Cochin Nano, CUSAT, Kochi, February 20-23, 2016.
31. Hybrid Materials: Bonding with Carbon Nanotubes, 100 Years of Chemical Bonding, IICT Hyderabad, August 4-5, 2016.
32. Self-assembly of pi-Gelators on Carbon Nanotubes, Amrita University Coimbatore, Dec. 19-21, 2016.
33. Fluorescent Molecules for Sensing and Imaging, ISCB Award Lecture, SRM University, Chennai, February 8, 2017.
34. Fluorescent Molecular Assemblies for Sensing and Security Application, NSACS, Guru Nanak Dev University, Amritsar, March 6-7, 2017.
35. Supramolecular Helicity of Molecular Assemblies, SMMA, IISER Kolkata, April 20-22, 2017.
36. Supramolecular Helicity of Molecular Assemblies, Emerging Frontiers of Chemical Sciences, Farook College, Calicut, September 23-25, 2017.

37. Fluorescent Probes for Sensing and Imaging of Biological Analytes, ICSBAM, Christian College, Chengannur, October 4-6, 2017.
38. The Power of Non-covalently Bonded Molecules, Linus Pauling Award Lecture, School of Chemical Sciences, MG University, Kottayam, Kerala, November 9, 2017.
39. Photophysical Properties and Applications of Fluorescent π -Gelators, TSRP, BARC, Mumbai, January 3-7, 2018.
40. Self-assembly and Materials Design, ICMST, IIST, Thiruvanthapuram, October 10-11, 2018.
41. Supramolecular Polymerization of π -Conjugated Molecules to Exotic Superstructures, Macro 2018, IISER Pune, December 19-22, 2018.
42. Designing Functional Materials by Molecular Self-assembly, MRSI Distinguished Lecture Award, Bangalore, February 12-14, 2019.
43. Self-assembled Functional Dyes and Their Applications, EAS 9, National Taipei University of Technology, Taipei, September 17-20, 2019.
44. Squaraine Derived Molecular Probes, Asian ChIP 2019, Guru Nanak Dev University, Amritsar, November, 6-9, 2019.
45. Stimuli Responsive Supramolecular Materials, STAM 20, Mar Athanasius College, Kothamangalam, Kerala, January 14-16, 2020.
46. Stimuli Responsive Soft Materials, Doss Memorial Lecture, VIT Chennai, January 30-31, 2020.
47. Stimuli Responsive Supramolecular Functional Materials, ICAMSC 2020, Amritha Viswa Vidhyapeetham, Kollam, Kerala, August 10-12, 2020.
48. Bodipy Derived Functional Materials, Indo-Australian Workshop on Advanced Functional Materials (Webinar), November 11-12, 2021.
49. Bodipy Derived Stimuli Responsive Materials by Self-assembly, NCRAPS 2021, NIT Uttarakhand, December 19, 2021.

Foreign Visits for Scientific and Academic Activities

1. Chiba University, Japan, INSA-JSPS exchange scientist at the Department of Image Science, Aug-Dec 1993
2. Max-Planck Institut für Strahlenchemie, Mülheim, Germany, Alexander von Humboldt Fellow, Sep 1994-Feb 1996
3. University of Regensburg, Germany, DST-DAAD visiting scientist at the Institute for Organic Chemistry, Apr-Jun 1999
4. National Institute of Advanced Material Research, Tsukuba, Japan, INSA-JSPS exchange scientist, Jul-Sep 2003
5. Institute Charles Sadron, Strasbourg, France, Invited talk, Indo-French Symposium on Fibrillar Networks as Advanced Materials, Sep 2005

6. National University of Singapore, Singapore, Invite lectures at Nanyang Technological University, Nov 2005
7. National Taiwan Normal University, Tamkang University, National Tsing Hua University, National Taiwan University, Taiwan, Invited lecture, Nov 2005
8. Osaka, Japan, Invited lecture, International Conference on Functional pi-Systems, May 2006
9. Chiba University, Japan, DST-JSPS Exchange Project, Nov 2006
10. University of California, Irvine, United States of America, Invited lecture, Indo-US frontiers of Science Symposium, Jan 2007
11. University of Osaka, Japan, Visiting Professor, Jul 2007
12. Dinard, France, Invited lecture at IFCOS meeting, Sep 2007
13. University of Dresden, Germany, Invited talk, International conference on Reactive polymers, Sep 2007
14. Arcachon, France, Invited talk, Aquitaine conference on Polymers, Oct 2007
15. University of Chiba, Japan, DST-JSPS exchange visit, Feb 2008
16. Chinese Academy of Sciences, China, Invited Talk, Nov 2008
17. National Institute of Materials, Tsukuba, Japan, Invited visiting Scientist, Dec 2008
18. Institute Charles Sadron, Strasbourg, France, for carrying out research work on IFCPAR Project, Mar-Apr 2009
19. National Institute of Materials, Tsukuba, Osaka, Plenary talk at the East Asia Symposium, May-Jun 2009
20. Rio de Jeniro, Brazil, a member of Indian delegation to participate in a Indo-Brazil symposium on Advanced Materials, Sep 2009
21. Kuwait, Plenary Lecture at Kuwait Conference of Chemistry, Mar 2010
22. Krutyn Summer School, Poland, Invited Speaker, FINELUMEN VIth International Krutyn Summer School IKSS2010, Jun 2010
23. Kyoto, Japan, Invited Lecture, International Conference on Science and Technology of Synthetic Metals, Jul 2010
24. Grenoble, France, invited talk in the Indo-French Center for Organic Synthesis (IFCOS) meeting, Sep 2010
25. Australian National University and Monash University, Australia, Invited talk, Nov 2010
26. Yonsei University and Seoul National University, Korea, Invited talk and Scientific Discussions at The Korean Chemical Society and another talk at Seoul National University, Apr 2011
27. NIMS, Tsukuba, Japan, Indo-Japan joint project (DST-JSPS), Aug-Sep 2011
28. Bangkok, Thailand, Invited Talk at 14th Asian Chemical Congress, Sep 2011
29. Hangzhou, China, plenary talk at 5th East Asia Symposium on Functional Dyes & Advanced Materials, Sep 2011

30. Beijing, China, Invited talk at the 10th "International Symposium on Functional pi electron systems", Oct 2011
31. AIST, Takamatsu and NIMS, Tsukuba, Japan Japan-India bilateral seminar on Supramolecular Nanomaterials for Energy Innovation, AIST, Takamatsu, Japan DST-JSPS research collaboration Oct 2012
32. University of Namur, Belgium, Special invitation for a departmental seminar and for conducting a Ph.D. Examination, Nov 2012
33. Iranian Research Organization for Science and Technology (IROST) – Khwarizmi International Award (KIA) – Secretariat, Iran, to receive the 26th Khwarizmi International Award (KIA), Tehran, Iran, Feb 2013
34. Brussels, Belgium, Editors Symposium at the Royal Society of Chemistry, Mar 2013
35. Autrans and Grenoble, France, 51st Scientific Council and 22nd Industrial Research Committee meetings and Seminar on "Successful Indo-French S&T Cooperation: CEFIPRA", May 2013
36. Taipei, Taiwan, invited speaker in the "15th International Symposium on Novel Aromatic Compounds" (ISNA-15), Jul-Aug 2013
37. NIMS, Tsukuba, Japan, Indo-Japan Joint Project (DST-JSPS), Oct 2013
38. Okayama University of Science, Okayama, Japan, invited speaker at the 10th Green Elements Research Symposium, Dec 2013
39. Kumamoto University, Japan, invited speaker at the 4th PHOENICS international symposium at Kumamoto Institute for Photo-Electro Organics, Feb-Mar 2014
40. France, 53rd Scientific Council and 24th Industrial Research Committee meetings and the Vision Group meeting of CEFIPRA, May 2014
41. Bordeaux, France, Invited lecture at the XXVth IUPAC Symposium on Photochemistry, Jul 2014
42. NUS, Singapore, Invited lecture at the Humboldt Kolleg symposium on Environment and Health in 21st Century, Sept 2014
43. Sultan Qaboos University, Muscat, to participate in TWAS 25th General Meeting and receive TWAS 2013 Prize in Chemistry, Oct 2014
44. Osaka University, Japan, Indo-Japan Joint Project (DST-JSPS) Osaka University, Japan and International Polymer Conference (IPC), Nov-Dec 2014
45. Tokyo, Japan, Invited Talk at the 2014 International Symposium on Supramolecular Chemistry & Functional Materials organized by CEMS, Tokyo, Japan, Dec 2014
46. Germany, Invited lecture at the conference at the Residence of Wurzburg. Wurzburg, Germany, March 2015
47. Australia, Visiting Professor for scientific discussion and invited talks, Institute for Frontier Materials at Deakin University, Australia, Apr-May 2015
48. France, 55th Scientific Council and 26th Industrial Research Committee meetings and Outreach Programme at Nice, France, May-Jun 2015

49. Japan, Indo-Japan joint project (DST-JSPS) Osaka Prefecture University, Japan, Sept 2015
50. London, Editor's Symposium of the Royal Society of Chemistry (RSC), Feb 2016
51. Visit to Japan, in connection with the joint research project under DST-JSPS bilateral agreement, Visit to NORITAKE CO. LTD to discuss the ongoing and future collaborative programmes and discussion with Fuji Films, October 2016
52. Japan, Indo-Japan joint project (DST-JSPS) Osaka Prefecture University, Japan, March 2019
53. Taiwan, Plenary Speaker at the 9th East Asia Symposium on Functional Dyes and Advanced Materials organized by National Taipei University of Technology, Taipei, Taiwan, September 2019
54. Germany, CSIR-DAAD Cooperation- Delegation of CSIR-Directors to Germany, November 2019
55. Invited Lecture visit at various universities in Japan, October 17-28, 2022

List of Publications:

- 201 Squaraine Appended with Benzodipyrrole for Fluorescent Sensing of Methanol: Exciton Coupling Controls Photophysical Properties
R. Sawada, C. Govind, T. Maeda, N. Suzuki, S. Yagi, V. Karunakaran and **A. Ajayaghosh**
Chem. –Asian. J. 2023, 18, e202300868 (This article also appears in: Editors' Choice: Spotlights)
- 200 Expanding the Horizons of Covalent Organic Frameworks: Sub-Stoichiometric Synthesis as an Emerging Toolkit for Functional COFs
S. Vijayakumar, **A. Ajayaghosh** and S. Shankar
J. Mater. Chem. A, 2023, 11, 26340.
- 199 Metallosupramolecular Polymers: Current Status and Future Prospects
R. D. Mukhopadhyay and **A. Ajayaghosh**
Chem. Soc. Rev. 2023, 52, 8635.
- 198 Oxide Anchored Multi-Charged Metal Complexes with Binary Nanoparticles for Stable and Efficient Anti-Bacterial Coatings on Cotton Fabrics
A. Nirmala, S. Pottath, A. V. Prasannakumari, V. R. Gnanaraj, J. Jacob, B. S. Dileep Kumar, S. Pillai, R. K. Sukumaran, U. S. Hareesh, **A. Ajayaghosh** and S. Shankar
Mater. Adv. 2023, 4, 6213.
- 197 Controlling the Morphological Features, Aspect Ratio and Emission Patterns of Supramolecular Copolymers by Restricted Dimensional Growth
G. Das, A. Anand, B. Vedhanarayanan, A. Padmakumar, V. K. Praveen and **A. Ajayaghosh**

- Chem. –Eur. J.** **2023**, *29*, e202301819. (Part of the celebratory collection: collection: Prof. Maurizio Prato's 70th birthday)
- 196 Insights on the Molecular Orientation of Oligo(*p*-phenylene vinylene) Derivatives with Alkyl Chains in Langmuir Films
T. Shimoaka, Y. Yamaguchi, N. Shioya, **A. Ajayaghosh**, T. Mori, K. Ariga and T. Hasegawa
J. Phys. Chem. C **2023**, *127*, 9336.
- 195 Amplified Spontaneous Emission from Zwitterionic Excited-State Intramolecular Proton Transfer
A. Shukla, V. T. N. Mai, V. V. Divya, C. H. Suresh, M. Paul, V. Karunakaran, S. K. M. McGregor, I. Allison, K. N. N. Unni, **A. Ajayaghosh**, E. B. Namdas and S.-C. Lo
J. Am. Chem. Soc. **2022**, *144*, 13499.
- 194 Photocycloaddition as a Tool for Modulation of the Lower Critical Solution Temperature in a Molecular π -System to Control Transmission of Solar Radiation
S. Das, D. Patra, S. Shankar and **A. Ajayaghosh**
Angew. Chem. Int. Ed. **2022**, *61*, e202207641.
- 193 Tunable Capacitive Behavior in Metallopolymer-based Electrochromic Thin Film Supercapacitors
I. Mukkatt, A. P. Mohanachandran, A. Nirmala, D. Patra, P. A. Sukumaran, R. S. Pillai, R. B. Rakhi, S. Shankar and **A. Ajayaghosh**
ACS Appl. Mater. Interfaces, **2022**, *14*, 31900.
- 192 Structurally Directed Thienylenevinylene Self-Assembly for Improved Charge Carrier Mobility: 2D Sheets vs 1D Fibers
S. Ghosh, S. Prasanthkumar, S. Das, A. Saeki, S. Seki and **A. Ajayaghosh**
Chem. Commun. **2022**, *58*, 6837.
- 191 Synthesis, Photophysical and Electrochemical Properties of Bis-Squaraine Dyes Fused on Isomeric Benzodipyrrole Central Units
R. Sawada, T. Maeda, Y. Oda, S. Yagi, V. Karunakaran, H. Fujiwara and **A. Ajayaghosh**
Chem. –Asian. J. **2022**, *17*, e202200227. (VIP article, Part of Editors' Choice: Spotlights)
- 190 Role of Alkyl Groups Regulating Recombination and Mass Transport at Cobalt Electrolyte-Dye Interface in Dye Sensitized Solar Cells
L. Sivasankaran, S. C. Pradhan, R. K. Mishra, S. Soman and **A. Ajayaghosh**
Solar Energy **2022**, *236*, 182.
189. High-Frequency Electrochemical Double Layer Capacitor Based on Carbon Nanotubes Ink Coated Eggshell Membrane Electrodes
S. Das, M. Manuraj, R. B. Rakhi and **A. Ajayaghosh**
Journal of Energy Storage **2022**, *45*, 103799.
188. Enhanced Light Extraction from Organic Light Emitting Diodes Using a Flexible Polymer-Nanoparticle Scattering Layer

- A. K. Sajeev, N. Agarwal, A. Soman, S. Gupta, M. Katiyar, **A. Ajayaghosh** and K. N. N. Unni
Org. Electron. 2022, 100, 106386.
187. π -Extended Bodipy Self-Assembly as Supramolecular Photonic Security Ink and Optical Waveguide.
S. Cherumukkil, G. Das, R. P. N. Tripathi, G. V. PavanKumar, S. Varughese and **A. Ajayaghosh**
Adv. Funct. Mater. 2022, 32, 2109041.
186. Indoor Light-Harvesting Dye-Sensitized Solar Cells Surpassing 30% Efficiency without Co-Sensitizers.
R. Haridas, J. Velore, S. C. Pradhan, A. Vindhyaarumi, K. Yoosaf, S. Soman, K. N. N. Unni and **A. Ajayaghosh**
Mater. Adv. 2021, 2, 7773.
185. Structural Integration of Carbazole and Tetraphenylethylene: Ultrafast Excited-State Relaxation Dynamics and Efficient Electroluminescence.
S. K. M. McGregor, C. Govind, M. K. R. Wood, A. Shukla, H. Lim, R. J. Lepage, E. H. Krenske, K. N. N. Unni, **A. Ajayaghosh**, V. Karunakaran, E. B. Namdas and S.-C. Lo
Adv. Photonics Res. 2021, 2, 2000144.
184. White Organic Light-Emitting Diodes from Single Emissive Layers: Combining Exciplex Emission with Electromer Emission.
C. K. Vipin, A. Shukla, K. Rajeev, M. Hasan, S.-C. Lo, E. B. Namdas, **A. Ajayaghosh** and K. N. N. Unni
J. Phys. Chem. C 2021, 125, 22809.
183. Ligand Controlled Electrochromic Diversification with Multi-Layer Coated Metallosupramolecular Polymer Assemblies.
I. Mukkatt, A. Nirmala, N. Madhavan, S. Shankar B. Deb and **A. Ajayaghosh**
ACS Appl. Mater. Interfaces, 2021, 13, 5245.
182. Tweaking a BODIPY Spherical Self-Assembly to 2D Supramolecular Polymers Facilitates Excited State Cascade Energy Transfer.
G. Das, S. Cherumukkil, A. Padmakumar, V. B. Banakar, V. K. Praveen and **A. Ajayaghosh**
Angew. Chem., Int. Ed. 2021 60, 7851.
181. Thermochromic Color Switching to Temperature Controlled Volatile Memory and Counter Operations with Metal-Organic Complexes and Hybrid Gels.
A. Nirmala, I. Mukkatt, S. Shankar and **A. Ajayaghosh**
Angew. Chem., Int. Ed. 2021, 60, 455.
180. A New Pentacyclic Pyrylium Fluorescent Probe that Responds to pH Imbalance During Apoptosis.
S. Chakraborty, M. M. Joseph, S. Varughese, S. Ghosh, K. K. Maiti, A. Samanta and **A. Ajayaghosh**
Chem. Sci. 2020, 11, 12695. (Part of the themed collection: Celebrating 10 years of Chemical Science)

179. Regulating Back Electron Transfer Through Donor and π -Spacer Alterations in Benzothieno[3,2-b]indole Based Dye-Sensitized Solar Cells.
P. R. Nitha, V. Jayadev, S. C. Pradhan, V. V. Divya, C. H. Suresh, J. John, S. Soman, and **A. Ajayaghosh**
Chem. –Asian. J. **2020**, *15*, 3503.
178. Silicon Shadow Mask Technology for Aligning and in situ Sorting of Semiconducting SWNTs for Sensitivity Enhancement: A Case Study of NO₂ Gas Sensor.
P. B. Agarwal, R. Sharma, D. Mishra, N. K. Thakur, A. Agarwal and **A. Ajayaghosh**
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177. Enhanced Emission in Self-Assembled Phenyleneethynylene Derived π -Gelators.
G. Das, R. Thirumalai, B. Vedhanarayanan, V. K. Praveen and **A. Ajayaghosh**
Adv. Opt. Mater. **2020**, *8*, 2000173. (Part of special issue on 20 years of aggregation-induced emission research)
176. Supramolecular Surface Charge Regulation in Ionic Covalent Organic Nanosheets for Reversible Exfoliation and Controlled Bacterial Growth.
A. Mal, S. Vijayakumar, R. K. Mishra, J. Jacob, R. S. Pillai, B. S. Dileep Kumar and **A. Ajayaghosh**
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175. Metal Ion-Induced Capacitance Modulation in Near-Isostructural Complexes-Derived Electrochromic Coordination Polymers.
I. Mukkatt, P. M. Anjana, A. Nirmala, R. B. Rakhi, S. Shankar and **A. Ajayaghosh**
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V. K. Praveen, B. Vedhanarayanan, A. Mal, R. K. Mishra and **A. Ajayaghosh**
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173. Diketopyrrolopyrrole-Based Functional Supramolecular Polymers: Next-Generation Materials for Optoelectronic Applications.
S. Ghosh, S. Shankar, D. S. Philips and **A. Ajayaghosh**
Mater. Today Chem. **2020**, *16*, 100242.
172. Solution Processable Deep-Red Phosphorescent Pt(II) Complex: Direct Conversion from Its Pt(IV) Species via a Base-Promoted Reduction.
L. Allison, H. Lim, A. Shukla, V. Ahmad, M. Hasan, K. Deshmukh, R. Wawrzinek, S. K. M. McGregor, J. K. Clegg, V. V. Divya, C. Govind, C. H. Suresh, V. Karunakaran, K. N. N. Unni, **A. Ajayaghosh**, E. B. Namdas and S.-C. Lo
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171. Controlling the Supramolecular Polymerization of Donor-Acceptor π -System Through Hydrogen Bond Intervention.
V. S. Nair, B. Vedhanarayanan and **A. Ajayaghosh**
ChemPlusChem **2019**, *84*, 1405. (Part of special issue on π -conjugated (macro)molecules and their applications supramolecular chemistry, highlighted with a cover page)

170. Bimodal Detection of Carbon Dioxide Using Fluorescent Molecular Aggregates.
R. K. Mishra, S. Vijayakumar, A. Mal, V. Karunakaran, J. C. Janardhanan, K. K. Maiti, V. K. Praveen and **A. Ajayaghosh**
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169. Hybrid Materials from Poly[vinyl chloride] and Organogels.
Z. Zoukal, S. Elhasri, A. Carvalho, M. Schmutz, D. Collin, V. K. Praveen, **A. Ajayaghosh** and J.-M. Guenet
ACS Appl. Polym. Mater. **2019**, *1*, 1203.
168. Supramolecular Gel Phase Controlled [4+2] Diels-Alder Photocycloaddition for Electroplex Mediated Chromaticity Modulation.
S. Das, N. Okamura, S. Yagi, and **A. Ajayaghosh**
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167. A Self-Recovering Mechanochromic Chiral π -Gelator.
K. K. Kalathil, V. S. Nair, V. K. Praveen, M. Takeuchi and **A. Ajayaghosh**
J. Mater. Chem. C **2019**, *7*, 1292.
166. Charge Carrier Polarity Modulation in Diketopyrrolopyrrole Based Low Bandgap Semiconductors by Terminal Functionalization.
S Ghosh, R Raveendran, A Saeki, S Seki, M. Namboothiry and **A. Ajayaghosh**
ACS Appl. Mater. Interfaces, **2019**, *11*, 1088.
165. Enzyme-Driven Switchable Fluorescence-SERS Diagnostics Cocktail for the Multiplex Detection of Lung Cancer Biomarkers.
G. Saranya, M. M. Joseph, V. Karunakaran, J. B. Nair, V. N. Saritha, V. S. Veena, K. Sujathan, **A. Ajayaghosh** and K. K. Maiti
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164. Intramolecular Exciton-Coupled Squaraine Dyes for Dye-Sensitized Solar Cells.
T. Maeda, T. V. Nguyen, Y. Kuwano, X. Chen, K. Miyanaga, H. Nakazumi, S. Yagi, S. Soman and **A. Ajayaghosh**
J. Phys. Chem. C **2018**, *122*, 21745–21754.
163. Real Time Imaging and Dynamics of Hippocampal Zn^{2+} under Epileptic Condition Using a Ratiometric Fluorescent Probe.
H. Santhakumar, R. V. Nair, D. S. Philips, S. J. Shenoy, A. Thekkuveetil, **A. Ajayaghosh** and R. S. Jayasree
Sci. Rep. **2018**, *8*, 9069.
162. A Cyclometalated Ir(III) Complex as Lysosome Targeted Photodynamic Therapeutic Agent for Integrated Imaging and Therapy in Cancer Cells.
K. V. Sudheesh, P. S. Jayaram, A. Samanta, K. S. Bejoymohandas, R. S. Jayasree and **A. Ajayaghosh**
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161. Supramolecular Reassembly of Self-Exfoliated Ionic Covalent Organic Nanosheets for Label-Free Detection of dsDNA.
A. Mal, R. K. Mishra, V. K. Praveen, M. A. Khayum, R. Banerjee and **A. Ajayaghosh**
Angew. Chem., Int. Ed. **2018**, *57*, 8443. (VIP Article)
160. A Hybrid Organogel of a Low Band Gap Diketopyrrolopyrrole with PC₇₁BM: Phase Separated Morphology and Enhanced Photoconductivity.
S. Ghosh, S. Das, A. Saeki, V. K. Praveen, S. Seki and **A. Ajayaghosh**
ChemNanoMat **2018**, *4*, 831. (Highlighted with a Cover Page and in ChemistryViews Magazine)
159. Hybrid Materials of 1D and 2D Carbon Allotropes and Synthetic π -Systems.
B. Vedhanarayanan, V. K. Praveen, G. Das and **A. Ajayaghosh**
NPG Asia Mater. **2018**, *10*, 107.
158. Stepwise Control of Host-Guest Interaction Using a Coordination Polymer Gel
R. D. Mukhopadhyay, G. Das and **A. Ajayaghosh**
Nat. Commun. **2018**, *9*, 1987.
157. Transforming a C₃-Symmetrical Liquid Crystal to a π -Gelator by Alkoxy Chain Variation
A. Sandeep, V. K. Praveen, D. S. Shankar Rao, S. Krishna Prasad and **A. Ajayaghosh**
ACS Omega **2018**, *3*, 4392.
156. Self-Assembly of Bodipy-Derived Extended π -Systems
S. Cherumukkil, B. Vedhanarayanan, G. Das, V. K. Praveen and **A. Ajayaghosh**
Bull. Chem. Soc. Jpn. **2018**, *91*, 100. (Highlighted with an inside cover)
155. Photokinetic Study on Remarkable Excimer Phosphorescence from Heteroleptic Cyclometalated Platinum(II) Complexes Bearing a Benzoylated 2-Phenylpyridinate Ligand
N. Okamura, T. Maeda, H. Fujiwara, A. Soman, K. N. Narayanan Unni, **A. Ajayaghosh** and S. Yagi
Phys. Chem. Chem. Phys. **2018**, *20*, 542.
154. pH-Controlled Nanoparticles Formation and Tracking of Lysosomal Zinc Ions in Cancer Cells by Fluorescent Carbazole-Bipyridine Conjugates
K. V. Sudheesh, M. M. Joseph, D. S. Philips, A. Samanta, K. K. Maiti and **A. Ajayaghosh**
ChemistrySelect **2018**, *3*, 2416.
153. Creation of 'Rose Petal' and 'Lotus Leaf' Effects on Alumina by Surface Functionalization and Metal Ion Coordination
R. D. Mukhopadhyay, B. Vedhanarayanan and **A. Ajayaghosh**
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152. An Unsymmetrical Squaraine Dye based Chemical Platform for Multiple Analyte Recognition
D. S. Philips, S. Ghosh, K. V. Sudheesh, C. H. Suresh and **A. Ajayaghosh**
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151. A Supramolecular Nanocomposite as Near Infrared Transmitting Optical Filter for Security and Forensic Applications
S. Ghosh, S. Cherumukkil, C. H. Suresh and **A. Ajayaghosh**
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150. Helix to Super-Helix Transition in π -Systems Self-assembly: Superseding of Molecular Chirality at Hierarchical Level
M. Hifsudheen, R. K. Mishra, B. Vedhanarayanan, V. K. Praveen and **A. Ajayaghosh**
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149. An Unprecedented Amplification of Near-Infrared Emission in a Bodipy Derived π -System by Stress or Gelation
S. Cherumukkil, S. Ghosh, V. K. Praveen and **A. Ajayaghosh**
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148. A Ratiometric Near Infrared Fluorogen for the Real Time Visualization of Intracellular Redox Status during Apoptosis.
G. Saranya, P. Anees, M. M. Joseph, K. K. Maiti and **A. Ajayaghosh**
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147. Nanosheets of Organic Molecular Assembly from Aqueous Medium Exhibit High Solidstate Emission and Anisotropic Charge Carrier Mobility
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146. Exfoliation of Reduced Graphene Oxide with Self-assembled π -Gelators for Improved Electrochemical Performance.
B. Vedhanarayanan, B. Babu, M. M. Shaijumon and **A. Ajayaghosh**
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143. Formation of Coaxial Nanocables with Amplified Supramolecular Chirality through an Interaction between Carbon Nanotubes and a Chiral π -Gelator
B. Vedhanarayanan, V. S. Nair, V. C. Nair and **A. Ajayaghosh**
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S. Anjamkudy, V. K. Praveen, K. K. Kartha, V. Karunakaran and **A. Ajayaghosh**
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D. S. Philips, S. Sreejith, T. He, N. V. Menon, P. Anees, J. Mathew, S. Sajikumar, Y. Kang, M. C. Stuparu, H. Sun, Y. Zhao and **A. Ajayaghosh**
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F. Aparicio, S. Cherumukkil, **A. Ajayaghosh** and L. Sánchez
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R. D. Mukhopadhyay and **A. Ajayaghosh**
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K. K. Kartha, V. K. Praveen, S. S. Babu, S. Cherumukkil and **A. Ajayaghosh**
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L. V. Nair, S. S. Nazeer, R. S. Jayasree and **A. Ajayaghosh**
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S. Prasanthkumar, S. Ghosh, V. C. Nair, A. Saeki, S. Seki and **A. Ajayaghosh**
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K. K. Kartha, A. Sandeep, V. C. Nair, M. Takeuchi and **A. Ajayaghosh**
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R. D. Mukhopadhyay, V. K. Praveen and **A. Ajayaghosh**
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125. A Ratiometric Fluorescent Molecular Probe with Enhanced Two-photon Response upon Zn^{2+} Binding for *in vitro* and *in vivo* Bioimaging
K. P. Divya, S. Sreejith, A. Pichandi, Y. Kang, Q. Peng, S. K. Maji, Y. Tong, H. Yu, Y. Zhao, P. Ramamurthy and **A. Ajayaghosh**
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S. S. Babu, V. K. Praveen, K. K. Kartha, S. Mahesh and **A. Ajayaghosh**
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Contributions to Technology development / commercialization

The following technologies have been developed through translation of the fundamental knowledge generated from the research group of Dr. Ajayaghosh at CSIR-NIIST.

1. Fluorescent materials for Security Applications

Stimuli responsive fluorescent molecules are required for protecting valuable documents from counterfeit and duplication. Some of the fluorescent materials, NIR dyes and hybrid materials developed by Ajayaghosh's research group are patented and are evaluated for security and energy saving applications. For example, a fluorescent molecular assembly developed by his research group exhibits fluorescence color change when it comes in

contact with water which is demonstrated as a security label for currencies and documents. In addition, a series of stimuli responsive fluorescent dyes and photonic materials have been designed for the development of security inks required for currency printing. A near infrared transmitting dye has been developed and used as security ink for invisible barcode printing. Flexible lenses coated with this ink are useful for NIR photography.

2. Disinfection-Solidification Systems for Pathogenic Biomedical Waste Disposal

Safe disposal of pathogenic medical waste is a challenge and is of contemporary relevance. A new approach using gel chemistry has been developed for the spontaneous disinfection and immobilization of pathogenic biomedical waste. The disinfection-solidification system developed with inherent antimicrobial activity, is capable of disinfecting both liquid as well as solid samples, and results in gelation, flocculation or solidification of the waste instantaneously upon mixing. The extent of solidification can be controlled so that the system ends up gelling or flocculating the medical waste or can be completely solidified. In-house experiments confirmed >99.9% microbial disinfection within 1 minute of contact and reduces the risks of spillage and occupational exposure. The treated waste may be disposed of as non-regulated medical waste and can be converted to composts for agriculture. Segregation, transportation and disposal of such disinfected medical waste are easier and safer with significant reduction in cost for a healthcare facility. This technology is IP protected by filing three patents which are licensed to industry.

3. Indigenous Development of DSSC Module Fabrication facility

Along with Dr. Suraj Soman, Ajayagosh developed an indigenous process for the production of large area dye sensitized light conversion devices for harvesting indoor light into electricity for IoT and other low power device applications. Indigenous production of large area devices is a challenge and is an unmet need of the country. In collaboration with Elixir Technologies, NIIST has developed indigenous large area device fabrication facility with the support of DST. This fully mechanized fabrication facility is the first of its kind and approximately 50-60% cheaper than the imported fabrication facilities. Large area photovoltaic modules fabricated using this device can be integrated with indoor tabletops and walls to generate low power required for various sensors and IoT devices. This is a priority area of Government of India under the Make-in-India program.

4. Superhydrophobic Materials and Coatings

A process for the preparation of superhydrophobic coating formulations based on molecular assemblies on carbon nanotubes has been developed and patented. This material has been shown to be useful for water repellent coatings, separation of oil from water and drag resistant coatings. Negotiations with industries are in progress for further developing commercially viable coating formulations. Multifunctional superhydrophobic systems that show non-wettability and antimicrobial behavior on multiple substrates such as glass, wood and metal have also been developed.

5. Planar Light Concentrators

In collaboration with Dr. Adersh Ashok, a hybrid planar light concentrator (HPLC) with switchable transparency modes and improved lateral light concentration by integrating geometrical optics and luminescent light concentrator technologies have been developed and filed for patent. The technology is enabled by steering a luminescent liquid waveguide (LLW) into the void space of light couplers embedded in the planar light concentrator (PLC), wherein the refractive index (RI) of the LLW is matched with the RI of PLC to achieve switchable transparency modes. This HPLC system will lead to a multifunctional power window when coupled with a photovoltaic (PV) cell and hence can function as a smart window that controls incident light propagation, at the same time generating electricity using the laterally directed light. Asahi Glass is interested in further developing this technology and is currently under discussion.

Major Technologies transferred to industry / commercialized

Among the different technologies developed, the following are the two major technologies licensed to various industries and commercialized

1. Gel-based Disinfection-Solidification Systems for Safe Disposal of Pathogenic Biomedical Waste, Know-how transferred to M/s Bio Vastum Solutions Pvt. Ltd., Angamali, Kerala (2021)
Technology Transfer Fee: Rs. 10.08 Million + taxes + Royalty
2. Fluorescent Materials for Security Applications, Know-how transferred to HueBright, Bengaluru, Karnataka (2020)
Technology Transfer Fee: Rs. 25 lakhs + taxes + Royalty
CSIR Technology Award (Certificate of Merit)

In addition to the above, as the director of the institute, mentored and facilitated several technology developments and licensing worth of nearly Rs. 120 million over a period of last 6 years. These involves the development of agriculture waste based alternate materials for one time used plastics, conversion of industrial waste to building materials, development of solar cell module fabrication facility etc.

Infosys Science Foundation Prize Citation

The Infosys Prize for Physical Sciences is awarded to Dr. A. Ajayaghosh for his pioneering development of methods for the construction of supramolecular functional materials, which can be employed as components in organic electronic devices and in powerful substance selective optical sensing and imaging.

"The committee was impressed with two of his achievements. The first one was development of superior light harvesting devices. These are devices, which can convert light to energy i.e. photonic. And the second area was the detection of very tiny amounts, centigrams of TNT and other dangerous substances with a rather simple step."