Dr. S. Chandirasekar
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BIOSKETCH

Our research group is working on fluorescent noble metal nanoclusters for in vitro and in vivo bioimaging and fluorometric sensing applications. Metal nanoclusters composed of tens to hundreds of atoms with a size of less than 2 nm. In this size regime, the collective oscillation of conduction band electrons of their larger nanoparticle breaks into discrete energy levels, which leads to the size-dependent fluorescence properties from UV to near-IR region. Also, we are developing new biopolymeric micelles for drug delivery applications. Polymeric micelles are a type of drug delivery system for poorly water-soluble drugs that consist of a core-shell structure composed of amphiphilic block copolymers.

Educational Profile

- **Doctor of Philosophy (Ph.D.) in Polymer Science**
  Year of Passing: 2015
  Thesis title: Bio-surfactant and bio-polymers templated fluorescent noble metal nanoclusters and nanoparticles for bioimaging and sensing applications.
  Thesis Supervisor: Prof. N. Rajendiran, Department of Polymer Science, University of Madras

- **Master of Science (M.Sc.) in Polymer Science**
  Department of Polymer Science
  University of Madras

- **Bachelor of Science (B.Sc.) in Chemistry**
  C. Kandaswamy Naidu College for Men, Chennai
  University of Madras

Positions Held

April 2025 – Present	Associate Professor Functional Polymers and Nanophotonics Laboratory Department of Nanoscience & Technology PSG Institute of Advanced Studies Peelamedu, Coimbatore

October 2022 – March 2025	Assistant Professor Functional Polymers and Nanophotonics Laboratory Department of Nanoscience & Technology PSG Institute of Advanced Studies Peelamedu, Coimbatore.
March 2019 – March 2022	Post-Doctoral Fellow Supervisor: Prof. M. Sarojadevi Department of Chemistry Anna University, Guindy, Chennai
March 2017 – Feb 2019	National Post-Doctoral Fellow Supervisor: Prof. Ashok Kumar Mishra Department of Chemistry Indian Institute Technology- Madras, Chennai
Jan 2016 – Feb 2017	Post-Doctoral Fellow Supervisor: Prof. Wei-Lung Tseng Department of Chemistry National Sun Yat-sen University, Taiwan
June 2015 – Dec 2015	Assistant Professor Department of Chemistry C. Kandaswamy Naidu College For Men, Chennai
July 2009 – Dec 2009	Assistant Professor Department of Chemistry C. Kandaswamy Naidu College For Men, Chennai

Research Areas:

- Atomically precise luminescent metal nanoclusters
- Biopolymeric micellar systems for drug delivery applications

Awards & Achievements

1. Dr. D. S. Kothari Postdoctoral fellowship (Mar 2019 –Mar 2022) University Grant Commission (UGC), Government of India.
2. National Post-Doctoral fellowship (Mar 2017 – Feb 2019) Science and Engineering Research Board (SERB), New Delhi, Government of India.
3. Direct-Senior Research Fellowship – (Apr 2013 – Mar 2015) Council of Scientific and Industrial Research, New Delhi, Government of India.

Research Group

Research Scholars (Ongoing)

Student Name: Ms. Jofel Jose J

Research Topic: Thiomers templated fluorescent nanoclusters

E-mail: jofeljosej300@gmail.com

Funded Projects

Ongoing

1. Title of the Project : Smart Multiarm Star Polymeric Micelles-Templated Fluorescent Metal Nanoclusters for Mucoadhesive Drug Delivery Applications.
   Funding Agency : Anusandhan National Research Foundation (ANRF), Government of India.
   Role : Principle Investigator (PI)
   Scheme : Startup Research Grant (SRG)
   Period : Oct 2023 - Oct 2025
   Budget : Rs. 24.5 L
2. Title of the Project : Exploration of Designing Parameters for Development of Robust and Durable Micro/Nanostructured Superomniphobic Fabrics.
   Funding Agency : Defence Research and Development Organisation (DRDO), Government of India.
   Role : Co-Principle Investigator (Co-PI)
   Scheme : Contract for Acquisition of Research Services (CARS)
   Period : April 2025 - March 2028
   Budget : Rs. 23.28 L

Completed

1. Title of the Project : Designing of New Multi-emission Nano-hybrids for Ratiometric Sensing of Environmentally Important Bio-chemical Substances.

Funding Agency : Science and Engineering Research Board (SERB), Government of India.

Period : Mar 2017 - Feb 2019

Budget: Rs. 19.2 L

2. Title of the Project : Polymers Templated Fluorescent Metal Nanoclusters for Drug Delivery and Imaging Applications.

Funding Agency : University Grant Commission, UGC, Government of India.

Period : Mar 2019 - Mar 2022

Budget: Rs. 24.6 L

Laboratories In-charge

1. Functional Polymers and Nanophotonics Laboratory

Invited Talks

1. Resource person in One day workshop on "optical characterization in materials chemistry" to give a lecture on "Fluorescence Spectroscopy: Fundamentals and Applications" on 04th April 2025, conducted by PSGIAS, Department of Chemistry and Nanoscience and Technology.

Patent Published

- Method of Preparing Thiomer-Stabilized Visible and NIR-emitting Gold Nanoclusters, Application No. 202541085282, Publication Date: 26/09-2025.

Journal Publications

1. "Facile Synthesis of Bile Salt Encapsulated Gold Nanoparticles and It's Use in Colorimetric Detection of DNA". **S. Chandirasekar**, G. Dharanivasan, J. Kasthuri, K. Kathiravan, and N. Rajendiran.
   J. Phys. Chem. C, 2011, 115, 15266–15273.
2. "Sodium Cholate Templated Blue Light Emitting Ag Subnanoclusters: *In Vivo* Toxicity and Imaging in Zebrafish Embryos". **S. Chandirasekar**, C. Chandrasekaran, T. Muthukumarasamyvel, G. Sudhandiran and N. Rajendiran.
   ACS Appl. Mater. Interfaces, 2015, 7, 1422−1430
3. "Label Free Fluorometric Characterization of DNA Interaction with Cholate Capped Gold Nanoparticles Using EthidiumBromide as a Fluorescent Probe". G. Dharanivasan, D. M. I. Jesse, **S. Chandirasekar**, N. Rajendiran, and K. Kathiravan.
   J. Fluorescence, 2014, 24, 1397-1406.
4. "Antibacterial activity of gold nanoparticles and their toxicity assessment" K. Umamaheswari, R. Baskar, K. Chandru, N. Rajendiran, **S. Chandirasekar.** ***BMC Infectious Diseases,*** 2014, 14(Suppl 3):P64.

5. "Bioactive Bile Salt-Capped Silver Nanoparticles Activity against Destructive Plant Pathogenic Fungi through *In Vitro* System" M. T. Raja, **S. Chandirasekar**, G. Dharanivasan, D. Nallusamy, K. Kathiravan.
   RSC Adv., 2015, 5, 71174–71182.
6. "Biosurfactant Templated Quantum Sized Fluorescent Gold Nanoclusters for In Vivo Bioimaging in Zebrafish Embryos". **S. Chandirasekar**, C. Chandrasekaran, T. Muthukumarasamyvel, G. Sudhandiran and N. Rajendiran.
   Colloids and Surfaces B: Biointerfaces, 2016, 143, 472–480.
7. "Hierarchical Self-assembly of Bile acid-Derived Dicationic Amphiphiles and Their Toxicity Assessment on Microbial and Mammalian Systems". T. Muthukumarasamyvel, R. Baskar, **S. Chandirasekar**, K. Umamaheswari, and N. Rajendiran
   ACS Appl. Mater. Interfaces, 2016, 8, 25111−25126
8. "A Gold Nanocluster-based Fluorescent Probe for Simultaneous pH and Temperature Sensing and Its Application to Cellular Imaging and Logic Gates" Y.T. Wu, **S. Chandirasekar**, W.B. Tseng, M.M. Hiseh and W.L. Tseng
   Nanoscale, 2016, 8, 11210–11216.
9. "Oligonucleotide-Based Fluorescent Probe for Sensing of Cyclic Diadenylate Monophosphate in Bacteria and Diadenosine Polyphosphates in Human Tear" J. H. Lin, W.B. Tseng, K. C. Lin, C. Y. Lee, **S. Chandirasekar**, W.L. Tseng, and M. M. Hsieh
   ACS Sens., 2016, 1, 1132−1139.
10. "Boosting catalytic activity of metal nanoparticles for 4-nitrophenolreduction: Modification of metal naoparticles with poly(diallyldimethylammonium chloride)" J. G. You, S. Chandirasekar, Y. W. Liub, C. J. Yub,W. L. Tseng.
    Journal of Hazardous Materials, 2017, 324, 420–427.
11. "Green Synthesis of Sodium Cholate Stabilized Silver Nanoparticles: An Effective Colorimetric Sensor for Hg2+ and Pb2+ Ions". Vanitha Marimuthu, **Shanmugam Chandirasekar**, Nagappan Rajendiran,
    Chemistry Select, 2018, 3, 3918-3924.
12. "Zwitterionic Biosurfactant Encapsulated Shape Controlled AgNPs: An Assessment of Shape effect on Catalytic Properties". Vanitha Marimuthu, **Shanmugam Chandirasekar**, Jayapalan Kasthuri, Nagappan Rajendiran, ***Chemistry Select,*** 2018, 3, 7129-7136. **I.F:**
13. "Synthesis of Gold nanoclusters-Loaded Lysozyme Nanoparticles for label-free Ratiometric Fluorescent pH Sensing: Applications to Enzyme-Substrate System and Cellular Imaging". **Shanmugam Chandirasekar**, Jyun-Guo You, J-H Xue, Wei-Lung Tseng, ***J. Mater. Chem. B,*** 2019, 7, 3876-3883.
14. **"**Synthesis of N-Acetylcysteine Conjugated Cholic Acid Stabilized Gold and Silver Nanoparticles: Evaluation of Their Catalytic Activity and Toxicity Assessment**".** N. Ezhumalai, M. Nanthagopal, **S. Chandirasekar**, M. Elumalai, M. Narayanasamy, G. Singaravelu, N. Rajendiran, ***Chemistry Select,*** 2021, 6, 5474-5487.
15. **"**N-Cholyl D-Penicilamine Micelles Templated Red Light-Emitting Silver Nanoclusters: Fluorometric Sensor for S^{2-} Ions and Bioimaging Application Using Zebrafish model**".** Elumalai, Manikandan; **Chandirasekar, Shanmugam**; Vimalraj,

Selvaraj; Ezhumalai , Nishanthi ; Kasthuri , Jayaplan ; Rajendiran, Nagappan, ***Langmuir*** 2022, 38, 24, 7580–7592.

16. **“**Photo-induced synthesis of star poly(DL-Lactide)-templated Au and Ag nanoparticles and evaluation of their catalytic performance**”.** Chandirasekar Shanmugam, Vanitha Marimuthu, Nagappan Rajendiran, ***Reactive and Functional Polymers 194 (2024) 105772***.