Dr. Anil Rao H.N.

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Education

	Degree	Year	Institute	Specialization
1	B.Sc.,	2003	Kuvempu University	Physics, Chemistry and Mathematics
2	M.Sc.,	2005	Kuvempu University	Chemistry
3	Ph.D	2015	Incheon National University, South Korea	Polymer Chemistry

Professional Experience

	Date (from-to)	Designation	Organization
1	01-08-2016 to Till date	Assistant Professor	Siddaganga Institute of Technology
2	01-03-2015 to 28-02-2016	Postdoctoral Research Scientist	Korea Institute of Science and Technology, Seoul, South Korea
3	16-02-2006 to 15-02-2011	Senior Research Associate	Syngene International Limited, Bangalore

Affiliations of Professional organizations

- Incheon National University
- Korea Institute of Science and Technology
- Siddaganga Institute of Technology

Awards and Honors

- Best poster awarded at Membrane Society Korea Conference 2012 and 2013.
- Awarded Jindal scholarship during Masters.

Courses Taught

Undergraduate Courses

- Engineering Chemistry
- Organic Chemistry
- Instrumental Methods of Analysis
- Biology for Engineers

Research Areas

- Polymer Chemistry
- Nanomaterials
- Materials for Energy Storage Devices
- Green Chemistry

Sponsored Projects

Ongoing Projects:

1. Title: DABCO-Piperidinium based ionic liquids: A new class of polymer electrolyte materials for alkaline fuel cell applications.
   Funding Agency: VGST K-FIST L1
   Amount: 15.0 Lakhs
   Duration: 2 Years
   Role: Principal Investigator

Completed Projects:

1. Title: A new class of pseudocapacitive binary metal sulphides anodes for sodium-ion battery
   Funding Agency: VGST K-FIST L1
   Amount: 15.0 Lakhs
   Duration: 2 Years
   Role: Co-Principal Investigator

Publications

Journals

23. Engineering Z-scheme SnS_2/rGO/g-C_3N_4 ternary photocatalysts for efficient degradation of malachite green and murexide dyes under visible light. SC Shyagathur, J Pattar, Anil H. N Rao, R Sreekanth, K Mahendra, Journal of Molecular Structure 1329, 141366. Q1. https://doi.org/10.1016/j.molstruc.2025.141366.

22. Facile green synthesis of CuWO4 nanoparticles and its application for the photocatalytic degradation of rose Bengal dye under visible light irradiation. EV Kumar, CM Swamy, Anil H. N Rao, M Shashank, K Deepa, GR Suma, Inorganic Chemistry Communications. 2025, 172, 113706. Q1. https://doi.org/10.1016/j.inoche.2024.113706.

21. Tuning the dielectric and photocatalytic properties of MgO nanomaterials through Mn doping: A Comprehensive study. J Pattar, SC Shyagathur, K Mahendra, Anil H. N Rao, R Sreekanth. Ceramics International, 2025. Q1. https://doi.org/10.1016/j.ceramint.2025.01.181

20. Exploring the charge transport mechanism, electrical conductivity, and dielectric properties of polyaniline/tin sulfide nanocomposites. Basheerabegum Faniband, S. Sarvesh Chandra, Jayadev Pattar, H. N. Anil Rao, R. Sreekanth, K. Mahendra, M. V. Murugendrappa, Sanna Kotrappanavar Nataraja, M. Nagaraja Polymer Composites, 2025, Q1. https://doi.org/10.1002/pc.29478.

19. Visible light-driven degradation of Brilliant Green and Indigo Carmine organic contaminants using SnS2/GCN/rGO and CuS/GCN/rGO ternary composites–A comparative study. Shyagathur Sarvesha Chandra, Pattar Jayadev, Anil H N Rao, R Sreekanth K, Mahendra, Ganganagappa, Nagaraju. Flatchem, 2025, 49,100805. Q1. https://doi.org/10.1016/j.flatc.2024.100805.

18. Highly conductive candle-soot-based polymer composite as a conductive ink for flexible electronic applications. Vishwanath H S, Shridhar Mundinamani, Anil H. N Rao. Journal of Materials Science: Materials Electronics Springer Publications. 2024, 35, 31, 1-12 Q2. https://doi.org/10.1007/s10854-024-13763-2

17. Enhanced Degradation of Dyes Using a Novel CuS/g-C3N4/rGO Ternary Composite Catalyst: Synthesis, Characterization, and Mechanistic Insights. Shyagathur Sarvesha Chandra, Pattar Jayadev, Anil H. N Rao, K, Mahendra, Ganganagappa, Nagaraju. Materials Chemistry and Physics. 2024, 327, 129877. Q1. https://doi.org/10.1016/j.matchemphys.2024.129877

16. Enhanced Photocatalytic Applications of Ni-Doped MoO3 Nanoparticles Synthesized via Green Combustion Process Using Garcinia Cambogia Seed Powder. Naveen M. V, Krishnamurthy G, Yuvaraj T C M, Anil H.N. Rao, R. Harini, Anitha C. Rao, Nagaraju G. Journal of Materials Science: Materials Electronics Springer Publications, 2024, 35, 26, 1746. Q2. https://doi.org/10.1007/s10854-024-13320-x

15. Anion exchange membrane based on poly(arylene ether sulfone)s functionalized with quinuclidinium-piperidinium dual cations for vanadium redox flow battery applications.

Nagadarshan S.S, Harshitha H.Y, and M H Halashankar Swamy and Anil Rao H. N. Polymer, 2024, 302, 127025. Q1. https://doi.org/10.1016/j.polymer.2024.127025

14. A novel one-pot synthesis strategy for β-$Mn_2V_2O_7$ nanorods synthesized via 1-(3,6-dioxa heptane) 3-methyl imidazolium methane sulfonate-assisted hydrothermal route for sustainable and on-demand advanced supercapacitor electrodes and as negative electrode materials for Li-ion batteries. Dr Nirmala B. T.L Soundarya; M Jayachandran; T Maiyalagan; Nagaraju G; Anil Rao H N. Journal of Energy Storage 2024, 85, 111076. Q1. https://doi.org/10.1016/j.est.2024.111076

13. SnS_2 based SnS_2/rGO/g-C_3N_4 Z-scheme ternary nanocomposites for efficient visible light-driven photocatalytic activity. Sarvesha Chandra Shyagathur, Anil H. N. Rao, Pooja Kodamballi Ravishankar, Ganganagappa Nagaraju, Jayadev Pattar. Optical Materials. 2024, 147, 114688-114698. Q1. https://doi.org/10.1016/j.optmat.2023.114688

12. Preparation of polypyrrole by chemical oxidation: Applications for sensor studies. S. Pavithra, R. Thejas, Anil H. N. Rao, B. S. Krishna, G. Nagaraju. Macromolecular Research. 2023, 32, 23-33 Q2. https://doi.org/10.1007/s13233-023-00210-0

11. Design of Novel $M_{(MnNi)}V_2O_6$ NPs via Combustion Synthesis for Photocatalytic Performance on Dual Dye and Dopamine. Biosensing. Smitha Patil, M. Shashank, G. Nagaraju, Anil H. N. Rao. Optik. 2023, 272, 170231. Q2. https://doi.org/10.1016/j.ijleo.2022.170231

10. Experimental investigation of synthesized Al_2O_3 Ionanofluid's energy storage properties: Model-prediction using gene expression programming. Praveen Kumar Kanti, K.V. Sharma, Anil H. N. Rao, Masoud Karbasi, Zafar Said. Journal of Energy Storage. 2022, 55, 105718. Q1. https://doi.org/10.1016/j.est.2022.105718

9. Quinuclidinium-piperidinium based dual hydroxide anion exchange membranes as highly conductive and stable electrolyte materials for alkaline fuel cell applications Smitha S Patil, Madhura V, Irshad Kammakakam, M H Halashankar Swamy, K Sadashiva Patil, Zhiping Lai, Anil Rao H N. Electrochimica Acta 2022, 426, 140826. Q1 https://doi.org/10.1016/j.electacta.2022.140826

8. Understanding the alkaline stability of imidazolium and benzimidazolium functionalized poly(phenylene oxide) based hydroxide exchange membranes. Anil H.N. Rao, S. Murthy Shekhar M.H.Halashankar Swamy , H.K.Pranava P. Kushal.

Materials Today Proceedings. 2022. 51, 2550-2555. https://doi.org/10.1016/j.matpr.2021.12.352

7. Anion exchange membranes based on terminally crosslinked methyl morpholinium-functionalized poly(arylene ether slfone)s. Sohyun Kwon, Anil H N Rao and Tae-Hyun Kim. Journal of Power Sources. 2018, 375:31, 421-432. Q1.

https://doi.org/10.1016/j.jpowsour.2017.06.047

6. Alkyl bisimidazolium-mediated crosslinked comb-shaped polymers as highly conductive and stable anion exchange membranes. Anil H N Rao, SangYong Nam and Tae-Hyun Kim. RSC Advances, 2016, 6, 16168-16176. Q1. DOI: 10.1039/C5RA25190G

5. Comb-shaped a lkyl imidazolium-functioanlized poly(arylene ether sulfone)s as high performance anion exchange membranes. Anil H N Rao, SangYong Nam and Tae-Hyun Kim. Journal of Material Chemistry A. 2015, 3, 8571-8580. Q1.

https://doi.org/10.1039/C5TA01123J

4. An imidazolium-based ionene blended with crosslinked PEO as a novel polymer membrane for selective CO2 separation. I. Kammakakam. Anil H N Rao, H W Yoon, S Y Nam, H B Park, and Tae-Hyun Kim. Macromolecular Research, 2014, 22(8), 907-916. Q2.

3. Crosslinked poly(arylene ether sulfone) block copolymers containing pendant imidazolium groups as both crosslinkage sites and hydroxide conductors for highly selective and stable membranes. Anil H N Rao, SangYong Nam and Tae-Hyun Kim. International Journal of Hydrogen Energy, 2014, 39, 5919-5930. Q1. https://doi.org/10.1016/j.ijhydene.2014.01.191

2. Cardo poly(arylene ether sulfone) block copolymers with pendant imidazolium side chains as novel anion exchange membranes for direct methanol alkaline fuel cell. Anil H N Rao, Hyoung Juhn Kim, Sukoo Nam and Tae-Hyun Kim. *Polymer*, 2013, 54, 6918-6928. Q1. http://dx.doi.org/10.1016/j.polymer.2013.10.052

1. Imidazolium-functioanlized poly(arylene ether sulfone) block copolymer as an anion exchange membrane for alkaline fuel cell. Anil H N Rao, Roshni Lilly Thankamony, Hyoung Juhn Kim, Sukoo Nam and Tae-Hyun Kim. Polymer, 2013, 54, 111-119. Q1. https://doi.org/10.1016/j.polymer.2012.11.023

Reviewer of Journal

- **Elsevier**: Journal of Membrane Science, International Journal of Hydrogen Energy
- **Springer**: Macromolecular Research, Polymer Bulletin
- **Wiley**: Journal of Applied Polymer Science

Patents

4. Cellulose paper based lead sensor. Design Patent. Patent No: **334496-001**. Affiliation: Siddaganga Institute of Technology

3. Alkyl bisimidazolium-mediated crosslinked anion exchange membranes with comb-shaped structure. **Anil H. N Rao**, Tae-Hyun Kim**. Korean Patent**. Patent no: **10-2016-0005528**. Filed Date: 15-03-2016 Affiliation: Incheon National University

2. Self-aggregated anion exchange membranes with comb-shape. **Anil H. N Rao**, Tae-Hyun Kim. **Korean Patent**. Patent no: **10-2015-0019757**. Filed Date: 09-02-2015. Affiliation: Incheon National University

1. Macromolecular cross-linker block copolymer, cross-linked polymer membrane using the same and method for manufacturing thereof. **Anil H. N Rao**, Tae-Hyun Kim. **Korean Patent**. Patent no**: 10-2015-0012731**. Filed Date: 14/04/2014. Affiliation: Incheon National University

Invited Lectures, talks and workshops

- Morpholinium-functionalized Terminally Crosslinked Anion Exchange Membranes for Alkaline Fuel Cell Applications. Oral talk. International Conference on Advanced Polymers for Science and Technology APST-2016. Organized by VIT, Vellore during 24-26th October 2016.
- Development of Imidazolium-based Anion Exchange Polymer Membranes for High Performance Alkaline Fuel Applications. Invited talk. International Conference on Emerging Trends in Chemical Sciences. Organized by Manipal Institute of Technology during 14-16th September 2017.
- Controlled Crosslinking Methods for Obtaining Highly Conductive and Stable Anion Exchange Membranes for Alkaline Fuel Cell Applications. Oral talk. International Conference on Advances in Chemical and Materials Sciences. Organized by Mangalore University during 17-19th October 2019.
- Highly conductive and stable poly(arylene ether sulfone)s copolymer tethered with dual hydroxide conductors quinuclidinium and piperidinium cations as novel anion exchange membranes. Online invited talk. Organized by NMR Research Centre, IISc Bangalore on 19th October 2020.

- Conducting Polymer Electrolyte Membranes and Its Applications. Online invited talk held by AMC College of Engineering Bangalore on the eve of World Science Day on 15th November 2021.
- Electrochemical Evaluation of Membrane-Electrode-Assembly for Fuel Cells. Online invited talk for 5 day workshop held by CIPET: SARP Bangalore during 14-21st March 2022.
- Hydrocarbon Membranes for fuel cell and battery applications. Online invited talk on the eve National Science day organized by REVA University on 28th February 2024.