

Scientist / Officers bio-data

a. Name.

Dr. Katchala Nanaji

b. Education background

M.Sc (Chemistry), SSSIHL Puttaparthi, Anantapur

Ph. D. (Chemistry), IIT Madras, Chennai

c. Designation

Scientist



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e. Experience:

Scientist, ARCI Hyderabad : January 2021 – till date

Project Scientist, ARCI Hyderabad: November 2017- December 2020

f. Research areas of interest:

1. Design and Development of efficient electrode materials for Metal-ion battery and Supercapacitors for commercial use.
2. Development of large-scale synthesis of electrode materials for supercapacitors and Metal-ion battery.
3. Fabrication of commercial scale supercapacitor and metal-ion capacitor (or battery supercapacitor hybrid).
4. Materials for visible light photo catalysis.
5. Porous carbon, Porous metal oxides synthesis by various synthetic methods.

g. List of Journal Publications:

1. **K. Nanaji**, B.V. Sarada, U. V. Varadaraju Tata N. Rao, S. Anandan, “Investigating the dual role of potassium hydroxide as pore inducing agent as well as a catalyst to obtain graphene-like carbon sheets for supercapacitors with ultra-fast rate capability” *Renewable Energy*, 2021, 172, 502-513.
2. **K. Nanaji**,# P.V. Srinivas,# S. Anandan, M. Pramanik, K. Narayanan, R. Balasubramaniam, Tata N. Rao “Petroleum coke as an efficient single carbon

- source for high energy and high power Lithium-ion capacitors” *ACS Applied Energy Materials*, 2021, 35, 9010-9016. (# Equal Author Contribution).
3. **K. Nanaji**, Tata N. Rao, Varadaraju U.V, S. Anandan, “Novel graphitic porous carbon nanosheets from jute stick as anode material for lithium-ion battery with superior electrochemical properties” *International Journal of Energy Research* 2020, 44, 2289-2297.
 4. **K. Nanaji**, Varadaraju U.V, Tata N. Rao, S. Anandan “Robust, Environmentally Benign Synthesis of Nanoporous Graphene Sheets from Bio-waste for Ultrafast Supercapacitor Application”, *ACS Sustainable Chemistry & Engineering*, 2019, 7, 2516-2529.
 5. **K. Nanaji**, Hari Mohan. E, Sarada V. B, Varadaraju U.V, N. Rao Tata, Anandan. S, “One step synthesized hierarchical spherical porous carbon as an efficient electrode material for lithium ion battery”, *Materials Letters*, 2019, 237, 156-160.
 6. **K. Nanaji**, Varadaraju U.V, Tata N. Rao, S. Anandan "Pore size engineered three dimensional ordered mesoporous carbons with improved electrochemical performance for supercapacitor and lithium ion battery applications" *Chemistry Select* 2019, 4, 10104 -10112.
 7. **K. Nanaji**, R. K. Siri Kiran, Tata N. Rao, S. Anandan, “Energy Level Matching for Efficient Charge Transfer in Ag Doped-Ag Modified TiO₂ for Enhanced Visible Light Photocatalytic Activity” *Journal of Alloys and Compounds*, 2019, 794, 662-671.
 8. **K. Nanaji**, A. Jyothirmayi, U.V. Varadaraju, T. N. Rao, S. Anandan, “Facile synthesis of mesoporous carbon from furfuryl alcohol-butanol system by EISA process for supercapacitors with enhanced rate capability”, *Journal of Alloys and Compounds*, 2017, 723, 488-497.
 9. E. Hari Mohan, **K. Nanaji**, S. Anandan, S.V. Bulusu, B.V. Appa Rao, T.N. Rao, “One-step Induced Porous Graphitic Carbon Sheets as Supercapacitor Electrode Material with Improved Rate Capability”, *Materials Letters*, 2019, 236, 205-209.
 10. T. Mitravinda, **K. Nanaji**, S. Anandan, A. Jyothirmayi, Ch. Sai Kiran, Tata N Rao, Chandra Sharma, “Facile synthesis of corn silk derived nanoporous carbon for an improved supercapacitor performance”, *Journal of The Electrochemical Society*, 2018, 165 (14), A3369-A3379.
 11. S. Ghosh, R. Santhosh, S. Jeniffer, V. Raghavan, **K. Nanaji**, P. Kollu, S K Jeong and A Grace, “Natural biomass derived hard carbon and activated carbons as electrochemical supercapacitor electrodes” *Scientific Reports*, 2019, 9, 16315.
 12. Usha Rani, **K. Nanaji**, Tata N. Rao, A. S. Deshpande, “Corn husk derived activated carbon with enhanced electrochemical performance for high-voltage supercapacitors” *Journal of Power Sources* 2020, 471, 228387.
 13. P. Samhita, **K. Nanaji**, M. Sreekanth, Tata N. Rao, S. K. Martha, B. V. Sarada “Cost-effective Synthesis of Electrodeposited NiCo₂O₄ Nanosheets with Induced Oxygen Vacancies : A Highly Efficient Electrode Material for Hybrid Supercapacitors” *Batteries & Supercaps*, 2020, 3, 1209-1219.
 14. M. Vijayakumar, A. Bharathisankar, D. S. Rohita, **K. Nanaji**, Tata N. Rao, M. Karthik, "Achieving High Voltage and Excellent Rate Capability Supercapacitor

- Electrodes Derived from Bio-renewable and sustainable Resource" *ChemistrySelect*, 2020, 5, 8759-8772.
15. E. Hari Mohan, **K. Nanaji**, S. Anandan, B.V. Appa Rao, Tata N. Rao "Porous Graphitic Carbon Sheets with High Sulfur Loading and Dual Confinement of Polysulfide Species for Enhanced Performance of Li-S Batteries" *Journal of Materials Science*, 2020, 55, 16659-16673.
 16. E. Hari Mohan #, **K. Nanaji** #, S. Anandan, B.V. Appa Rao, Tata N. Rao "A Facile One-Step Synthesis of Bio-inspired Porous Graphitic Carbon Sheets for Improved Lithium-Sulfur Battery Performance", *International Journal of Energy Research* 2021 (# Equal Author Contribution ; Under Revision).
 17. S. Praveen Kumar, B. Rekha Madhuri, **K. Nanaji**, S. Anandan, Tata Narasinga Rao, Ramkrishna Sahoo "Cost Effective Strategy towards the Development of C/SnO₂ Composite for Li/Na-ion Battery" Sustainable Energy & Fuels, 2021 (Under Review)

h. List of Patents:

1. **K. Nanaji**, V. Pavan Srinivas, S. Anandan, T. Narasinga Rao, K. Narayanan, B. Ramachandra Rao and M. Pramanik "Method of producing nanoporous graphene sheet-like structured high and low surface area carbon sheets from petroleum coke" (*Patent number: No.202011007399 dt. 20/2/2020*).
2. **K. Nanaji**, S. Anandan, Tata N. Rao, Method of producing graphene like structured nanoporous carbon material from Jute stick based bio-waste for Energy Storage applications and the product Thereof, Indian Patent **Application No. E-2/276//2018/DEL dt. 16/2/2018**).

i. Book Chapters:

1. **K. Nanaji**, M. Vijayakumar, A. Bharathisankar and M. Karthik, "Highly Functionalized Nanostructured Titanium Oxide-Based Photocatalysts for Direct Photocatalytic Decomposition of NO_x/VOCs" has been accepted to publish in the Springer Series book entitled '*Nanostructured Materials for Environmental application*'
2. **K. Nanaji**, UV Vardaraju, Tata N Rao and S. Anandan, "Synthesis and application of porous carbon based electrode materials for supercapacitors" has been submitted for Springer Series Book on Materials for Electrochemical energy storage

j. Awards and Honours:

1. Awarded **Prof Werner Prize for the best Ph. D thesis** in Chemistry for the year 2020 during the 57th convocation of IIT Madras.
2. Selected with **Institute Research Award** for the year 2019-2020 for the Excellence in research work by IIT Madras
3. Recipient of prestigious **Young Scientist award in Chemistry** for the year 2019 from Dr. K.V. Rao Scientific Society, Hyderabad, India
4. Qualified in a global competition among young scientists worldwide to participate in the **70th Lindau Nobel Laureates Meeting at Lindau, Germany**, June 28-July 3rd, 2020
5. Recipient of **DST-DFG award** from Government of India to attend the Lindau Nobel Laureates Meeting 2020
6. Recipient of Travel grant from STRC-Department of Science and Technology, Govt. of India to attend and give a presentation in the 235th ECS Meeting at Dallas, USA, May 26-30, 2019.
7. Award for **best poster presentation** at “Battery Technologies & Electric Mobility” conference, organized by HP Green R & D Centre, Bangalore, March 8-9, 2018.
8. Award for **best oral presentation** at “National Conference on Carbon Materials 2015” conference, organized by NPL Delhi & Indian Carbon Society at New Delhi, November 28, 2015.
9. Awarded **Senior Research Fellowship** from Dept. of Science and Technology, Govt. of India
10. Qualified in All India Graduate Aptitude Test in Engineering (**GATE**), Gov. of India, 2014
11. Central sector scheme of scholarship for a period of 5 years (UG & PG) from ministry of Science and Technology, Govt. of India

k. Presentation delivered in National/International Conferences:

1. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Carbon materials and the correlation of structural and electrochemical properties” at India International Science Festival 2020 (IISF 2020), India, December 22-25, 2020.
2. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Graphene like porous carbon sheets derived from hibiscus cannabinus as a versatile electrochemical energy storage material” in 235th ECS Meeting at Dallas, USA, May 26-30, 2019.
3. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Graphene Sheets like Nanoporous Carbon Derived from Agricultural Biowaste (jute stick) as Electrode Material for High Performing Super capacitors” at ‘International Conference on Super Capacitors and Energy Storage Applications (ICSEA-2019)’ at Thrissur, Kerala, March 08 - 09, 2019.

4. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Three Dimensional Ordered Mesoporous Carbons with Tunable Pore Sizes as Efficient Electrode Material for Improved Lithium Ion Battery and Supercapacitor Applications” at Carbon MEMS: New Horizons’ at IIT, Hyderabad, December 05 -07, 2018.
5. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Bio-waste inspired graphene sheet like nanoporous carbon as a versatile electrode material for energy storage applications” in 9th Bangaluru India nano at Lalith Ashok, Bangalore, December 7-8, 2017.
6. Tata N. Rao, E. Hari mohan, P. Tejassvi, **K. Nanaji**, S. Anandan, “Mesoporous carbon and nanofiber interlayer as efficient polysulfide reservoirs for high performance Lithium-Sulfur batteries” in the workshop Lithium Sulfur Batteries VI at Dresden, Germany, November 6-7, 2017.
7. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Facile synthesis of mesoporous carbon by Evaporation Induced Self-Assembly as electrode material for supercapacitors with enhanced rate capability” in Nano India 2017 organized by IIT Delhi, New Delhi, March 15, 2017.
8. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Porous Carbon materials for Energy Storage applications : Li-ion batteries and Supercapacitors” in ICCON 2016 at SSSIHL, Prasanthinilayam, Ananatapur, February 13-14, 2016.
9. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “Ordered mesoporous carbon as an efficient anode material for Li-ion Battery application” at NCCM 2015, organized by NPL Delhi & Indian Carbon Society at New Delhi, November 28, 2015.
10. **K. Nanaji**, U. V. Varadaraju, T. N. Rao, S. Anandan, “A Hierarchical porous carbon as an efficient anode material for high power Li-ion battery” in Indo - Korean joint workshop on “Green Mobility and Energy Materials” organized by ARCI Hyderabad at Hyderabad November 26, 2015.
11. E Hari, **K Nanaji**, S Anandan, BVA Rao, TN Rao, “Development of Sulfur Cathode Comprising of Biomass Derived Activated Carbon As Host for Improved Lithium-Sulfur Battery Performance” in 233rd ECS Meeting at Seattle, USA, May 13-17, 2018.