Curriculum Vitae

Name: **Dr. Tata Narasinga Rao**
Director
(Additional Charge)

Address: **International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)**
Balapur P.O.
***Hyderabad**-500005*
India
Phone (office): +91-40-24441077
e-mail: tata@arci.res.in

(I) Awards / Honours:

1. Materials Research Society of India (MRSI) award, 2009.
2. FAPCCI Excellence Award (2011) for contribution as an outstanding scientist or engineer for the benefit of industry, trade or Agriculture (received from Chief Minister, AP)
3. Costal Chemical Research Award (CCRS) award-2013 in research category
4. Tokyo University of Science (TUS) President Award-2014 to be received in April 2014 in Japan
5. Elected as Academician of Asia Pacific Academy of Materials (APAM)-2015.
6 Best Creative Design Exhibition Stall award at Bangalore Nano-2015 conference
7 Technology Day National Award-2016 (received from President of India)
8. Fellow of Telangana Academy of Sciences-2017
9. Fellow of AP Academy of Sciences-2017
10. *Bangalore India Nano Innovation Award-2018* (receiver from Bharat Ratna, Prof. CNR Rao)

(II) Performance indicators:

Number of publications	: **187**
Total citations	: **15135**
Highest cited paper	: Cited **7281** times (Scopus) – S.No.181 in the list
H-Index	: **51** (Scopus)
Number of patents (issued/filed)	: **23**
Processes developed	: **10**, Technologies transferred : 3
Ph.Ds – guided	: **7,** Ongoing**: 6**

(III) Past positions:

Team Leader	:	Center for Solar Energy Materials, ARCI
Team Leader	:	Center for Nanomaterials, ARCI

Lecturer/PDF : University of Tokyo, Japan
Research Associate: IIT-Madras, Chennai
Guest Faculty (past): University of Hyderabad & IIT Hyderabad

Major contributions to technology missions of national importance

1. National Electric Mobility Mission:

- **Dr. Rao is "Lead Scientist"** for development of technology for production of Li-ion battery materials and demonstration at industrial scale for electric vehicle (EV) applications
- Developed and demonstrated large scale production of LiFePO4 (LFP) cathode and Lithium titanate (LTO) anode for Li-ion batteries.
- Ready to transfer technology for LFP cathode, which is a key cathode material for EVs and highly relevant for India due to its high safety and low cost.
- **Dr. Rao is the "Principal investigator'** for project on development of first indigenized supercapacitor with capacity above1000F, 2.7V for EV applications.
- Developed activation process for Indian PetCoke (in collaboration with HPCL) to produce supercapacitor grade electrode material and performance benchmarked with global products.
- Demonstrated a prototype electric bicycle powered by ARCI-developed supercapacitors made form PetCoke-derived activated carbon electrodes.
- ***Dr. TN Rao received Bangalore India Nano Innovation Award-2018 (receiver from Bharat Ratna, Prof. CNR Rao)***

2. Nanotechnology mission

- **Dr. Rao is a lead scientist** in technology demonstration and commercialization of nanotechnology in textile and water fields.
- Developed large-scale synthesis process of nanosilver suspensions for antibacterial textile applications and technology transferred to Indian company for commercialization.
- Developed large-scale synthesis process of photocatalytic nano-TiO2 suspensions for self-cleaning textile applications and technology transferred to Indian company for commercialization.
- Demonstrated nano-size importance in high performance Li-ion battery materials (cathode and anodes)

(Dr. Rao received (on behalf of ARCI) "Technology Day National Award-2016" for the above technologies)--- (received from President of India)

3. National solar mission

- **Dr. Rao is Principal investigator** of an India-USA consortium project (SERIIUS) for development of solar thermal and thin film solar photovoltaic devices by vacuum and non-vacuum methods.

- The project led to the demonstration of medium temperature cost-effective solar thermal absorber tubes and the technology transferred to an Indian industry for process heat applications.
- Easy-to-clean coatings for dust mitigation of PV panels and development of CIGS-based thin film solar PV devices were demonstrated.

4. Technologies developed and commercialized for Disinfection of Covid-19:

- Developed a UVC-Trolley for disinfection of hospitals to fight against COVID-19 in collaboration with University of Hyderabad and Mekins Industries Ltd. Hyderabad.
- Developed a UVC cabinet for disinfection of objects in research laboratories and commercial establishments in collaboration with Mekins Industries Ltd.
- Developed UVC-baggage scanner (KritiScan UV) for a rapid disinfection of baggage at airports, in collaboration with Vehant Industries Ltd., New Delhi.

(IV) Technology and business development

1. ***Identifying industrial needs and targets of national missions*** *(Eg., National Electric Mobility Mission, Nanotechnology Mission)*
2. ***Planning technology road map based on emerging technologies and needs*** *in Materials Engineering (Eg., Materials for Li ion batteries, Materials for smart agriculture, water technologies)*
3. ***Identifying the right industrial partners for technology/business development*** *(Eg., HPCL, Toyota Tsucho, Travencore Titanium, SPEL-Pune, Resil chemicals-Bangalore, Parisara Bio-Renewables, etc.)*
4. ***Drafting agreements (MOU / NDA) with government Institutes/Industries*** *for Technology collaboration. (Eg., IMMT Bhubaneswar, VSSC-Tiruvnthapuram, Bromine Technologies, Isreal, Sri Chitra Institute, Tiruvanthapuram etc.)*
5. ***Planning business models*** *(start-ups, incubators, technology licensing, Section 8 company etc.)*
6. ***Identifying the potential for in-house technologies****, facilitating patent (IP) filing, connecting suitable partners for technology development through higher TRL levels.*

(V) Teaching and Academics:

Dr. Tata Narasinga Rao is known for his excellent teaching skills and passion for teaching. Dr. Tata N. Rao was Lecturer at the Department of Applied Chemistry at the University of Tokyo for one and half years, teaching Materials Science and Electrochemistry for B.Tech level students. He was requested to teach Physical Chemistry for B. Tech.s, at IIT Hyderabad, in the very first year when it was established. Dr. Rao taught Nanotechnlogy (synthesis techniques) to M. Tech, Nanotechnology students in the past at the school of Engineering Sciences, University of Tokyo for one semester. Dr. Rao also gave guest lectures at various faculty improvement programmes held at JNTU, Osmania University, NITW, University of Hyderabad etc. He is also on various Board of studies at Andhra University, JNTUH, and University of Hyderabad.

(VI) Education & research experience:

[1] Director (Additional Charge) (2021-Present)

[2] Scientist 'G' and Associate Director (2015-2021)

[3] Scientist 'F' (October 2008-2015), Scientist 'E' (2003-2008)
Team Leader
Centre for Nanomaterials and
Centre for Solar Energy Materials, ARCI, Hyderabad.

[4] Lecturer, Department of Applied Chemistry, The University of Tokyo, Japan (October 2001-March 2003)

[5] Postdoctoral Researcher, Department of Applied Chemistry, The University of Tokyo, Japan (January 1996-October 2001)

[6] Postdoctoral Researcher, IIT Madras, Chennai (June 1994 to Jan 1996)
Address: Material Science Research Center, Indian Institute of Technology, Madras 600036, India

[7] Ph.D. (Chemistry), Banaras Hindu University, Varanasi (1989-94)

(VII) List of Publications

Papers published:

1. Lal bahadur and **Tata N. Rao**, "Photoelectrochemical Studies of Cobalt doped ZnO Sprayed Thin Film Semiconductor Electrodes in Acetonitrile Medium" *Sol. Energy Mater. Sol. Cells.,* 27 (1992) 347.

2. Lal bahadur, J.P.Panday, and **Tata N. Rao**, "Photoelectrochemistry of ZnO Thin Film Electrode Sensitized by an Oxouranium (VI) Complex in an Acetonitrile Photocell" *Proc. Indian Acad. Sci. (Chem. Sci.),*105 Nos.4/5 (1993)235.

3. Lal bahadur, **Tata N. Rao** and J.P.Panday, "Extension of the spectral response of Sprayed ZnO Thin Film Electrodes Induced by Nickel and Cobalt Doping" *Semicond. Sci. Technol.,* 9, (1994) 275.

4. K. V. G. Kutty, C. K. Mathews, **Tata N. Rao** and U. V. Varadaraju, "Oxide ion conductivity in some substituted rare earth pyrozirconates" *Solid State Ionics.* 80 (1995) 99.

5. Lal bahadur and **Tata N. Rao**, "Photoelectrochemical investigations on particulate ZnO thin film electrodes in non-aqueous solvents" *J. Photochem. Photobiol. A:Chem* 91 (1995) 233.

6. **Tata N. Rao** and Lal bahadur, "Photoelectrochemical studies of dye sensitized particulate

ZnO thin film electrodes" *J. Electrochem.soc.*, 144, No. 1 (1997) 179.

7. Y. Komoda, **Tata N. Rao** and A. Fujishima, "Photoelectrorheology of TiO_2 Nanoparticle Suspensions" *Langmuir* 13 (1997) 1371.

8. **Tata N. Rao,** Y. Komoda and A. Fujishima "Photoeffects on Electrorheological Properties of TiO_2 Particle Suspensions" *Chemistry Letters* (1997) 307.

9. N. Sakai, Y. Komoda, **Tata N. Rao** and A. Fujishima "Effect of adsorbed water on the photoelectrorheology of TiO_2 particle suspensions" J. Electroanal. Chem., 445 (1998) 1.

10. Y. Komoda, N. Sakai, **Tata N. Rao**, D. A. Tryk and A. Fujishima "Photoelectrorheological phenomena involving TiO_2 particle suspensions" *Langmuir* , 14 (1998) 1081.

11. Y. Komoda, **Tata N. Rao**, D. A. Tryk, A. Fujishima, "Influence of the rotation rate of a rotary viscometer on the photoelectrorheologial properties of TiO_2 particle suspensions" *J. Electroanal. Chem*., 459 (1998) 155.

12. A. Fujishima, D. A. Tryk and **Tata N. Rao**, "New Approaches in CO_2 reduction" *Studies in surface science and catalysis* , B. Delmon and J. T. Yates (Eds.) Vol 114, page 31, 1998 Elsevier Science B. V.

13. **Tata N. Rao**, D. A. Tryk, K. Hashimoto, A. Fujishima, "Band-edge movements of semiconducting diamond in aqueous electrolyte induced by anodic surface treatment" *J. Electrochem. Soc.,* 146 (1999) 680.

14. **Tata N. Rao**, I. Yagi, T. Miwa, D. A. Tryk and A. Fujishima, "Electrochemical oxidation of NADH at highly boron-doped diamond electrodes" *Anal. Chem*., 71 (1999) 2506.

15. Y. Ohko, K. Ikeda, **Tata N. Rao**, K. Hashimoto and A. Fujishima, "Photocatalytic reaction kinetics on TiO_2 thinfilms under light-limited and mass transport-limited conditions" *Zeitschrift für Physikalische Chemie,* 213 (1999) S. 33.

16. B. V. Sarada, **Tata N. Rao**, D. A. Tryk, A. Fujishima, "Electrochemical characterization of highly boron-doped diamond microelectrodes in aqueous electrolytes" *J. Electrochem. Soc*., 146 (1999)1469.

17. Y. Maeda, K. Sato, R. Ramaraj, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "The electrochemical response of highly boron-doped conductive diamond electrodes to Ce^{3+} ions in aqueous solution" *Electrochimica Acta* 44 (1999) 3441.

18. A. Fujishima, **Tata N. Rao**, E. Popa, B. V. Sarada, I. Yagi, D. A. Tryk, "Electroanalysis of dopamine and NADH at conductive diamond electrodes*" J. Electroanal. Chem.,* 473 (1999) 179. Cited:

19. B. V. Sarada, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Electrochemical detection of serotonin at diamond electrode." *Chem. Lett.*, (1999) 1213.

20. B. V. Sarada, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Electroanalytical applications of conductive diamond electrodes" *New Diamond and Frontier Carbon Technology,* 9

(1999) 365.

21. A. Fujishima, **Tata N. Rao**, and D. A. Tryk, "TiO_2 Photocatalysts and diamond Electrodes." *Electrochim. Acta*, 45 (2000) 4683.

22. K. Honda, **Tata N. Rao**, D. A. Tryk and A. Fujishima, M. Watanabe, K. Yasui and H. Masuda, "Electrochemical characterization of nanoporous honeycomb diamond electrode as an electrical double-layer capacitor" *J. Electrochem. Soc*., 147 (2000) 659.

23. B. V. Sarada, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Electrochemical oxidation of histamine and serotonin at highly boron-doped diamond electrodes" *Anal. Chem*., 72 (2000) 1632.

24. H. Masuda, M. Watanabe, K. Yasui, D. A. Tryk, **Tata N. Rao** and A. Fujishima, "Fabrication of Nanostructured Diamond Honeycomb Film" *Advanced Materials*, 12 (2000) 444.

25. **Tata N. Rao**, B. V. Sarada, D. A. Tryk and A. Fujishima, "Electroanalytical study of sulfa drugs at diamond electrodes and their determination by HPLC with amperometric detection" *J. Electroanal*. Chem.,491 (2000) 175.

26. M. Yoshimura, K. Honda, R. Uchikado, T. Kondo, **Tata N. Rao**, D. A. Tryk, A. Fujishima, Y. Sakamoto, K. Yasui and H. Masuda, "Electrochemical Characterization of Nanoporous Honeycomb Diamond Electrodes in Nonaqueous Electrolytes" *Diamond and Related Materials*, 10 (2001) 620.

27. H. Masuda, K. Yasui, M. Waanabe, K. Nishio, **Tata N. Rao** and A. Fujishima, "Fabrication of ordered diamond/metal nanocomposite structures" *Chem. Lett*. (2000) 1112.

28. R. Uchikado, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Metal-modified electrode as an electrochemical detector for glucose" *Chem. Lett*., (2001) 144 .

29. H. Masuda, T. Yanagishita, K. Yasui, K. Nishio, I. Yagi, **Tata N. Rao** and A. Fujishima, "Synthesis of well-aligned diamond nanocylinders" *Adv. Mat.,* 13 (2001) 247.

30. D. A. Tryk, K. Tsunozaki, **Tata N. Rao** and A. Fujishima, "Relationships between surface character and electrochemical processes on diamond electrodes: dual roles of surface termination and near-surface hydrogen" *Diamond and Related Materials*, 10 (2001) 1804.

31. N. Spataru, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Determination of nitrite and nitrogen oxides by anodic voltammetry at conductive diamond electrodes." *J. Electrochem. Soc*., 148 (2001) E112.

32. K. Honda, **Tata N. Rao**, D. A. Tryk and A. Fujishima, M. Watanabe, K. Yasui and H. Masuda, "Impedance characteristics of the nanoporous honeycomb diamond electrodes for electrical double layer capacitor applications." *J. Electrochem. Soc*., 148 (2001) A668.

33. K. Honda, M. Yoshimura, **Tata N. Rao**, D. A. Tryk and A. Fujishima, K. Yasui, Y. Sakamoto, K. Nishio and H. Masuda, "Electrochemical properties of Pt-modified nanohoneycomb diamond electrodes" *J. Electroanal. Chem*., 514 (2001) 35.

34. H. Masuda, M. Watanabe, K. Yasui, K. Nishio, M. Nakao, T. Tamamura, **Tata N. Rao** and A. Fujishima, "Fabrication of through-hole membranes by oxygen plasma etching using anodic porous alumina mask" *Electrochem. Solid-State Lett*., 4 (2001) G101.

35. A. Fujishima and **Tata N. Rao**, "New directions in structuring and electrochemical applications of boron-doped diamond thin films." *Diamond and Related Materials*, 10 (2001) 1799.

36. M. Yoshimura, K. Honda, R. Uchikado, T. Kondo, **Tata N. Rao**, D. A. Tryk, A. Fujishima, Y. Sakamoto, K. Yasui and H. Masuda, "Factors controlling the electrochemical potential window for diamond electrodes in non-aqueous electrolytes" *Diamond and Related Materials*, 11 (2002) 67.

37. C. Terashima, **Tata N. Rao**, B. V. Sarada, D. A. Tryk and A. Fujishima, "Electrochemical oxidation of chlorophenols at boron-doped diamond electrode and their determination by high-performance liquid chromatography with amperometric detection" *Anal. Chem.,* 74 (2002) 895.

38. T. A. Ivandini, B. V. Sarada, C. Terashima, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Electrochemical detection of tricyclic antidepressant drugs by HPLC using highly boron-doped diamond eletrode" *J. Electroanal. Chem.,* 521 (2002) 117.

39. **Tata N. Rao**, B. H. Loo, B. V. Sarada, C. Terashima and A. Fujishima, "Electrochemical detection of carbamate pesticides at conductive diamond electrodes" *Anal Chem.,* 74 (2002) 1578.

40. T. Kondo, .Y Einaga, B. V. Sarada, **Tata. N. Rao** D. A. Tryk, and A. Fujishima, "Homoepitaxial single-crystal boron-doped diamond electrodes for electroanalysis" *J. Electrochem. Soc,* 149 (2002) E179.

41. K. Ohnishi, Y. Einaga, H. Notsu, C. Terashima, **Tata N. Rao**, S-G. Park and A. Fujishima, "Electrochemical glucose detection using nickel-implanted boron-doped diamond electrodes" *Electrochem. Solid-State Lett*., 5 (2002) D1-D3.

42. K. Tsunozaki, Y. Einaga, **Tata N. Rao** and A. Fujishima, "Fabrication and electrochemical characterization of boron-doped diamond microdisc array electrodes", *Chem. Lett.,* (2002) 502.

43. M. Yoshimura, K. Honda, T. Kondo, **Tata N. Rao**, D. A. Tryk, A. Fujishima, "Electrochemical Examination of the Ascorbic Acid Radical Anion in Non-Aqueous Electrolyte" *Electrochim. Acta*, 47 (2002) 4387.

44. K. Honda, M. Yoshimura, R. Uchikado, T. Kondo, **Tata N. Rao**, D. A. Tryk, A. Fujishima, M. Watanabe, K. Yasui, H. Masuda, "Electrochemical Characteristics for redox systems at nano-honeycomb diamond" *Electrochim. Acta*, 47 (2002) 4373.

45. O. Chailapakul, W. Siangproh, B. V. Sarada, C. Terashima, **Tata N. Rao**, D. A. Tryk and A. Fujishima, "The electrochemical oxidation of homocysteine at boron-doped diamond electrodes with application to HPLC amperometric detection" *Analyst*, 127 (2002) 1164.

46. C. Terashima, **Tata N. Rao**, B. V. Sarada and A. Fujishima, "Amperometric Detection of Oxidized and Reduced Glutathione at Anodically Pretreated Diamond Electrodes" *Chem. Lett*. 32 (2003) 136.

47. H. Olivia, B. V. Sarada, D. Shin, **Tata N. Rao**, and A. Fujishima, "Selective amperometric detection of dopamine using OPPy-modified diamond microsensor system" *Analyst*, 127 (1572) 2002.

48. C. Terashima, **Tata N. Rao**, B. V. Sarada N. Spataru and A. Fujishima, Electrodeposition of Hydrous Iridium Oxide on Conductive Diamond Electrodes for Catalytic Sensor Applications" *J. Electroanal. Chem*., 544 (2003) 65.

49. K. Honda, M. Yoshimura, **Tata N. Rao**, and A. Fujishima, "Electrogenerated chemiluminescence of the ruthenium tris(2,2')bipyridyl/amines system on boron-doped diamond electrode" *J. Phys. Chem*., 107 (2003) 1653.

50. C. Terashima, **Tata N. Rao**, B. V. Sarada and A. Fujishima, "Direct electrochemical oxidation of disulfides at boron-doped diamond electrodes" *Anal. Chem*., 75 (2003) 1564.

51. T. A. Ivandini, B. V. Sarada, C. Terashima, **Tata. N. Rao**, D. A. Tryk, H. Ishiguro, Y. Kubota and A. Fujishima, Gradient HPLC of Leucine-Enkephalin peptide and its metabolites by electrochemical detection using highly boron-doped diamond electrode, *J. Chromatography B*, 791 (2003) 63.

52. N. Spataru, K. Tokuhiro, C. Terashima, **Tata N. Rao** and A. Fujishima, "Electrochemical reduction of carbon dioxide at ruthenium dioxide deposited on boron-doped diamond" *J. Appl. Electrochem*. 33 (2003) 1205.

53. T. A. Ivandini, B. V. Sarada, **Tata N. Rao,** A. Fujishima, "Electrochemical oxidation of underivatized nucleic acids at highly boron-doped diamond" *Analyst,* 128 (2003) 924.

54. J. F. Zhi, H. B. Wang, T. Nakashima, **Tata N. Rao** and A. Fujishima, "Electrochemical incineration of organic pollutants on boron-doped diamond electrode. Evidance for direct electrochemical oxidation pathway", *J. Phys. Chem.,* 107 (2003) 13389.

55. X. T. Zhang, I. Sutanto, T. Taguchi, Q. B. Meng, **Tata N. Rao**, A, Fujishima, H. Watanabe, T. Nakamori and M. Uragami, "Al_2O_3-coated nanoporous TiO_2 electrode for solid-state dye-sensitized solar cell*" Sol. Energ. Mat. Sol. Cells*, 80 (2003) 315.

56. **Tata N. Rao**, T. A. Ivandini, C. Terashima, B. V. Sarada and A. Fujishima, "Applications of bare and modified diamond electrodes in electroanalysis" *New Diamond and Frontier Carbon Technology*, 13 (2003) 79.

57. T. Taguchi, X. T. Zhang, I. Sutanto, K. Tokuhiro,**Tata N. Rao**, H. Watanabe, T. Nakamori and M. Uragami and A. Fujishima, "Improving the performance of solid-state dye-sensitized solar cell using MgO-coated TiO_2 nanoporous film" *Chem. Commun*. 19 (2003) 2480.

58. L. Ouattara, I. Duo, T. Diaco, A. Ivandini, K. Honda, **Tata N. Rao**, A. Fujishima and Ch. Comninellis, "Electrochemical oxidation of ethylenediaminetetraacetic acid (EDTA) on BDD electrodes: Applications to waste water treatment" *New Diamond and Frontier Carbon Technology*, 13 (2003) 97.

59. M. Komatsu, **Tata N. Rao**, A. Fujishima, "Detection of hydroxyl radicals formed on an anodically polarized diamond electrode surface in aqueous media" *Chem. Lett.*, 32 (2003) 396.

60. Q. B. Meng, K. Takahashi, X. T. Zhang, I. Sutanto, **Tata N. Rao**, A. Fujishima, H. Watanabe, T. Nakamori and M. Uragami, "Fabrication of an efficient solid-state dye sensitized solar cell", *Langmuir*, 19 (2003) 3572.

61. T.A. Ivandini, **T. N. Rao**, A. Fujishima and Y. Einaga, "Electrochemical oxidation of oxalic acid at highly boron-doped diamond electrodes", *Analytical Chemistry*, 78 (2006) 3467-3471.

62. R.H. Tian, **Tata N. Rao**, Y. Einaga and J.F. Zhi, "Construction of two-dimensional arrays gold nanoparticles monolayer onto boron-doped diamond electrode surfaces" *Chemistry of Materials* 18 (2006) 939-945.

63. T.A. Ivandini, K. Honda, **Tata N. Rao**, A. Fujishima, Y. Einaga, "Simultaneous detection of Purinr and Pyrimidine at highly boron-doped diamond electrodes by using liquid chromatography" *Talanta* 71 (2007) 648-655.

64. Dibyendu Chakravarty, S.Bysakh, K.Muraleedharan. **Tata N.Rao** and R.Sundaresan, "Spark plasma sintering of MgO doped alumina with high hardness and fracture toughness" *Journal of the American Ceramic Society*, 91[1], 213-218, 2008.

65. Kaliyan Hembram, R. Vijay, Y. S. Rao and **Tata N. Rao** "Doped Nanocrystalline ZnO Powders for Non-linear Resistor Applications by Spray Pyrolysis Method" *Journal of Nanoscience and Nanotechnology* 9 (2009) 4376.

66. D. Chakravarty, H. Ramesh and **Tata N. Rao**, "High strength porous alumina by spark plasma sintering" *Journal of the European Ceramic Society* 29 (2009) 1361.

67. R. Subasri, M. Asha, K. Hembram, G.V.N. Rao and **Tata N. Rao**, " Microwave sintering of doped nanocrystalline ZnO and characterization for varistor applications, *Materials Chemistry and Physics* 124 (2010) 63.

68. R. Janardhanan, K. Murugan, H. Neha, **Tata N. Rao**, "Synthesis and surface chemistry of nanosilver particles" *Polyhedron* 12 (2009) 2522.

69. K. Madhav Reddy, **T.N. Rao**, K. Radha and J. Joardar, "Nanostructured Tungsten Carbides by Thermochemical Processing", *Journal of Alloys and Compounds*, 494 (2010) 404.

70. K. Madhav Reddy, **T.N. Rao**, J. Revathi and J. Joardar, "Structural stability of α/β-Mo_2C during thermochemical processing", *Journal of Alloys and Compounds*, 494 (2010) 396.

71. B.V. Sarada, C.L.P. Pavithra, M. Ramakrishna, **Tata N. Rao** and G. Sundararajan, Highly (111) Textured copper foils with high hardness and high electrical conductivity by pulse reverse electrodeposition, *Electrochemical and Solid State Letters*, 13 (2010) D40.

72. K. Murugan, **Tata N. Rao**, A.S. Gandhi and B.S. Murthy, "Effect of aggregation of methylene blue dye on TiO2 surface in self cleaning studies", *Catalysis Communications*, 11 (2010) 518.

73. K. Murugan, **Tata N. Rao**, K. Radha and Hina Gokhale, "Microwave plasma process optimization to produce nano titania through design of experiments" *Materials and Manufacturing Processes* 26 (2011) 803 .

74. N.Y. Hebalkar, S. Acharya and **T.N. Rao**, Preparation of bi-functional silica particles for antibacterial and sef-cleaning surfaces, *J. Colloid & Interface*, 364 (2011) 24.

75. K. Murugan, **T.N. Rao**, GVN Rao, AS Gandhi, BS Murty, Effect of dehydration rate on non-hydrolytic TiO2 thin film processing: Structure, optical and photocatalytic performance studies, *Materials Chem. & Physics*, 129 (2011) 810.

76. D. Chakravarty, BV Sarada, SB Chandrasekhar, K. Saravanan and **T.N. Rao**, A novel method of fabricating porous silicon, *Mater. Sci. Engg. A*, 528 (2011) 7831.

77. V. Balek, **T. N. Rao**, D.A. Tryk, A. Fujishima, Diffusion structural diagnostics of polycrystalline boron-doped diamond films, *Thermochimica Acta*, 524 (2011) 104.

78. K. Hembram, D. Sivaprahasam and **Tata N. Rao**, "Combustion synthesis of doped nanocrystalline ZnO powders for varistor appliations" *J. European Ceramic Society*, 31 (2011) 1905.

79. K. Nischala, **Tata N. Rao**, and Neha Hebalkar, "Silica-silver core shell particles for antibacterial textile application" *Colloids & Surfaces B-Biointerfaces*, 82 (2011) 203.

80. K. M. Reddy, **Tata N. Rao** and J. Joardar, "Stability of nanostructured W-C phases during carburization of WO3" *Materials Chemistry and Physics*, 128 (2011) 121.

81. R. Subasri, M. Tripathi, K. Murugan, J. Revathi, G.V.N. Rao and **Tata N. Rao**, " Investigations on the photocatalytic activity of sol-gel derived plain and Fe3+/Nb5+-doped titania coatings on glass substrates" *Materials Chemistry and Physics* 124 (2010) 63.

82. K. Wegner, B. Schimmoeller, B. Thiebaut, C. Fernandez and **Tata N. Rao**, *KONA Powder and Particle Journal*, (2011)

83. A, Bhaskar, M. Deepa, **T.N. Rao** and U.V. Varadaraju "Enhanced Nanoscale Conduction Capability of a MoO_2/Grapheme Composite for High Performance Anodes in Li ion Batteries", *Journal of Power Sources* 216 (2012) 169.

84. M. Chandra Sekhara Reddy, V. Vasudeva Rao, **T.N. Rao** and L. Syam Sundar, "Enhancement of Convective Heat Transfer Coefficient with TiO_2 Nanofluid in a Double Pipe Heat Exchanger", *International Journal of Nanotechnology and Applications*, Vol. 5, p 59-68, 2011.

85. S. Anadan, **T.N. Rao**, M. Sathis, D. Rangappa, I. Honma, M. Miyauchi, Superhydrophilic grapheme-loaded TiO2 thin film for self-cleaning applications, *ACS Applied Materials & Interfaces*, 5 (2013) 207.

86. A. Bhaskar, M. Deepa, **Tata. N. Rao** and U.V. Varadaraju, In-situ carbon coated Li2MnSiO4/C composites as cathodes for enhanced performance Li=ion batteries, , *J. Electrochem. Soc*., 159 (2012) A1954.

87. A. Bhaskar, M. Deepa and **Tata N. Rao**, MnO2/Multiwalled carbon nanotubes hybrid for use as a Li ion battery anode, *ACS Applied Meterials & Interfaces*, 5 (2013) 2555.

88. S. Sarma and **Tata N. Rao,** A novel method for measurement of porosity in nanofiber mat using pycnometer in filtration, *Journal of Engineered fibers and fabrics* 8 (2013) 132.

89. S. Anandan, **T.N. Rao**, R. Gopalan and Y. Ikuma, Fabrication of visible light driven N-doped ordered mesoporous TiO2 photocatalysts and their photocatalytic applications, J. Nanoscience & Nanotechnology, *J. Nanosci. Nanotechnol*. 13 (2013) 1-6.

90. K. Hembram, D. Sivaprahasam. K. Wegner and **T. N. Rao**, Large-scale manufacture of ZnO nanorods by flame spray pyrolysis, *J. Nanopartcile Research*, 15 (2013) 1461.

91. K. Murugan, R. Subasri, **Tata N Rao**, A.S. Gandhi and B.S. Murthy, Synthesis, Characterization and demonstration of self-cleaning TiO2 coatings on glass and ceramic tiles. *Progress in Organic Coatings,* 76 (2013)1756.

92. Ch L. P. Pavithra B.V. Sarada R.V. Koteswararao, **Tata N. Rao**, and G. Sundararajan, A new electrochemical approach for the synthesis of copper-graphene composite foils with high hardness, *Scientific Reports*, DOI:10.1038/srep04049 (2014).

93. K.H. Anulekha, S.S.Chandra, V. Sritharan and **Tata N. Rao**, Fabrication and Surface Functionalization of Electrospun Polystyrene Submicron Fibres with Controllable Surface Roughness, *RSC Advances* 4, 12188-12197 (2014).

94. K.H. Anulekha, S.S. Chandra, and **Tata N. Rao**, Donut-shaped Li4Ti5)12 structures as a high performance anode material for Li ion batteries, *Small* DOI:10.1002/ssmall.201303894.

95. S. Bhuvaneswari, P.M. Pratheeksha, S. Anandan, D. Rangappa, R. Gopalan, and **Tata N. Rao**, Efficient reduced graphene oxide grafted porous Fe3O4 composite as a high performance anode materials for Li ion batteries., *Phys. Chem. Chem. Phys*, 16, 5284-94, 2014..

96. SB Chandrasekhar, SS Sarma, M. Ramakrishna, PS babu, **Tata N Rao**, BP. Kashyap, Microstructure properties of hot extruded Cu-1wt% Al2O3 nano-composites synthesized by various techniques., *Materials Science and Engineering*, 53 (2014) 46.

97. K.H. Anulekha, S.S. Chandra, and **Tata N. Rao**, Electrochemical performance of Lithium Titanate submicron rods synthesized by sol gel/electrospinning, *Electroanalysis***,** DOI: 10.1002/elan.2004003.

98. A. Bhaskar, M. Deepa, M.Ramakrishna and **Tata N. Rao**, Poly (3,4 ethylenedioxy-thiophene) sheath over a SnO2 hollow spheres/graphene oxide hybrid for a durable anode in Li ion batteries, *J. Phys. Chem. C***,** 118 (2014) 7296.

99. A. Bhaskar, M. Deepa, and **Tata N. Rao**, Size-controlled SnO2 hollow spheres via a template free approach as anodes for Li-ion batteries, *Nanoscale***,** 6 (2014) 10762.

100. Sangeetha Aula, Samyuktha Lakkireddy, Swamy AVN, Atya Kapley,Kaiser Jamil, **Narasinga Rao Tata** and Kaliyan Hembram, Biological interactions in vitro of zinc oxide nanoparticles of different characteristics, IOP, *Materials Research Express* 1 (2014) 035041.

101. A. Bhaskar, M. Deepa, and **Tata N. Rao**, Tin Disulfide Nanoflowers versus Nanosheets as Anodes in Lithium-ion Batteries: How the Nanostructure Controls Performance, *Electrochimica Acta*, 184 (2015) 239.

102. K. Hembram, **Tata N Rao**, RS Srinivasa, AR Kulkarni, High performance varistors prepared from doped ZnO nanopowders made by pilot-scale flame spray pyrolyzer: Sintering, microstructure and properties, *J. European Ceramic Society*, 35 (2015) 3535.

103. R. Kumar, S. Anandan, K. Hembram and **Tata N. Rao**, Efficient ZnO-based visible light driven photocatalyst for antibacterial applications, *ACS Applied Meterials & Interfaces*, 6 (2014) 13138

104. Raju Kumar, D. Navadeepthy, K. Hembram, **T. N. Rao**, S. Anandan, "Visible-light induced photocatalytic disinfection of *E.coli* pathogens with Fe^{3+}-grafted ZnO nanoparticles" *Energy and Environment Focus* 4 (3) (2015) 232-238.

105. Ch. L. P. Pavitra, B.V. Srada, R. Koteswara Rao, M. Rama Krishna, G. Ravichandra, **Tata N. Rao** and G. Sundararajan, "Controllable crystallographic texture in copper foils exhibiting enhanced mechanical and electrical properties by pulse reverse electrodeposition" *Crystal Growth and Design*, 15 (2015) 4448.

106. SB Chandrasekhar, PN Wasekar, M. Ramakrishna, PS Bapu, **Tata N Rao** and BP Kashyap, Dynamic strain ageing in fine grained Cu-1 wt%Al2O3 composite processed by two step ball milling and spark plasma sintering, *J. Alloys & Compounds*, 656 (2016) 423.

107. Ch. L. P. Pavithra, B. V. Sarada, K. V. Rajulapati, **Tata N. Rao** and G. Sundararajan, Process Optimization for Pulse Reverse Electrodeposition of Graphene Reinforced Copper Nanocomposites, *Materials and Manufacturing Process***,** 31 (2016) 1439**.**

108. M. Nagini, A. Jyothirmayi, **Tata N Rao**, R. Vijay, A.V. Reddy, V. Koteswara Rao, and G. Sundararajan, Influence of dispersoids on corrosion behavior of oxide dispersion strengthened 18 Cr steels made by high energy milling, *J. Mat. Engg. & Performance*, **25**, (2016) 577. DOI: 10.1007/s11665-015-1859-5.

109. R. Kumar, G. Shiva Kumar, S.K. Janardhan Reddy, **Tata N. Rao**, S.V. Joshi and S. Anandan, One step route for the development of in-situ co-catalyst-modified Ti3+ self-doped TiO2 for improved visible-light photocatalytic activity, *ACS Applied Materials and Interfaces*, 8 (2016) 27642.

110. E. Hari Mohan, B.V. Sarada, RVR, Naidu, G. Sailan, A.K. Haridas., BV Appa Rao and **Tata N Rao**, Graphene-Modified electrodeposited dendritic porous tin structures as

binder-free anodes for high performance Li-S batteries., *Electrochimica Acta*, 219 (2016) 701.

111. PM Pratheeksha, EH Mohan, BV Sarada, M. Ramakrishna, K. Hembram, PVV Srinivas, PJ.Daniel, **Tata N. Rao**, and S. Anandan, Development of novel carbon coating strategy for producing core-shell structured carbon coated LiFePO4 for an improved Li-ion battery performance, *Phys, Chem. Chem. Phys*. 19 (2017) 175.

112. AK. Haridas, C.S. Sharma, H. Neha and **Tata N Rao**, Nano-grained SnO2/LTO composite hollow fibers via sol-gel/electrospinning as anode material for Li ion batteries, *Materials Today Energy*, 4 (2017) 14.

113. P. Tejassvi, S.S. Sarma, H. Neha, S. Anandan, K. Mohan, and **Tata N. Rao**, Enhanced electrochemical performance SiO2 nanofibers as Binder-free Anode**,** *Chemistry Letters* 46:7(2017) 1007.
114. K. Nanaji, A. Jyothirmayi, U.V. Varadaraju, **T. N. Rao**, and 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*, 723 (2017) 488.

115. M. Shastri, V. Gangaraju, N. Rani, E. Harimohan, **Tata N. Rao**, D. Rangappa, Spray drying combustion synthesis of LiNo0.45Mn2.45Co0.1O4/graphene nanocomposite and its electrochemical properties, *Materials Today: Proceedings* 4(2017) 12223.

116. D.K. Kaushik, **Tata N. Rao**, and A. Subrahmanyam, "Studies on the disorder in DC magnetron sputtered Cu2ZnSnS4 (CZTS) thin films grown in sulfide plasma", *Surface & coatings Technology***,** 314 (2017) 85.

117. A.K. Haridas, C.S. Sharma, and **Tata N. Rao**, "Electrospun SnO2/LTO composite sub-micron dimpled spheres as high performance anode material for lithium ion batteries" *ECS Transactions*, 77 (2017) 339.

118. N.S. Anans, R.K. Dash. **Tata N. Rao**, and R.Vijay, "Effect of carbon nanotubes as reinforcement on the mechanical properties of aluminium-copper-magnesium alloy", *Journal of Materials Engineering and Performance*, 26 (2017) 3376.

119. P. SaiKarthik, S.B. Chandrasekhar, D. Chakravarthy, P.V.V. Srinivas, V.S.K. Chakravadhanula, **T.N. Rao,** "Propellant grade ultra fine aluminum powder by RF induction plasma", *Advanced Powder Technology*, 29 (2018) 804**.**

120. K. Hembram, **Tata N. Rao**, M. Ramakrishna, R.S. Srinivasa, A.R. Kulkarni, "A novel economical grain boundary engineered ultra-high performance ZnO varistor with lesser dopants**",** *J. European Ceramic Society***,** 38 (2018) 5021.

121. M. Vijayakumar, R. Santhosh, J. Adduru, **Tata N. Rao**, M. Karthik, "Activated carbon fibers as high performance supercapacitor electrodes with commercial level mass loading" *Carbon* 140 (2018) 465.

122. M. Vijayakumar, J. Adduru, **Tata N. Rao**, M. Karthik, "Conversion of solar energy into electrical energy storage: supercapacitor as an ultrafast energy-storage device made from biodegradable agar-agar as a novel and low cost carbon precursor" *Global Challenges*, 2 (2018).

123. T. Mitravinda, K. Nanaji, S. Anandan, A. Jyothirmayi, C.V.S. Kiran, C.S. Sharma and **Tata N. Rao**, "Facile synthesis of corn silk derived nanoporous carbon for an improved supercapacitor performance" *Journal of The Electrochemical Society*, 165 (2018) A3369.

124. E.H. Mohan, S. Anandan, B.V. Appa Rao, **Tata N. Rao**, "Neem leaves derived micro and mesoporous carbon as an efficient polysulfide inhibitor for sulfur cathode in a Li-S battery" *Chemistry Letters* 48 (**2019**) 62.

125. E. Harimohan, K. Nanaji, S. Anandan, BV Sarada, M. Ramakrishna, A. Jyothirmai, B.V. Appa Rao, and **Tata N. Rao**, One-step induced porous graphitic carbon sheets as supercapacitor electrode material with improved rate capability, *Materials Letters*, 236 (2019) 205.

126. K. Nanaji, U.V. Varadaraju , **Tata N. Rao**, S. Anandan "Robust, Environmentally Benign Synthesis of Nanoporous Graphene Sheets from Biowaste for Ultrafast Supercapacitor Application", *ACS Sustainable Chem. Eng*. 7 (**2019**) 2516.

127. K. Nanaji, E. Hari Mohan, B.V. Sarada, U.V. Varadaraju, **Tata N. Rao**, S. Anandan, "One step synthesized hierarchical spherical porous carbon as an efficient electrode materials for Lithium ion battery, *Materials Letters*, 237 (**2019**) 156.

128. M. Vijayakumar, D. Sri Rohita, **Tata N. Rao**, Mani Karthik, Electrode mass ratio impact on electrochemical capacitor performance, *Electrochimica Acta***,** 298 (**2019**) 347**.**

129. P. M. Pratheeksha, J. Sri Rajeshwari, D. Paul Joseph, **Tata N. Rao**, and S. Anandan, "Investigation of *in-situ* carbon coated $LiFePO_4$ as a superior cathode materials for Lithium ion batteries", *Journal of Nanoscience and Technology*, 19, 3002, **2019**.

130. Katchala Nanaji, R. K. Srii Kiran Janardhana, **Tata N. Rao**, Srinivasan Anandan, Energy Level Matching for Efficient Charge Transfer in Ag Doped Ag Modified TiO2 for

Enhanced Visible Light Photocatalytic Activity**,** *J. Alloys and Compounds* , 794, 662-671, **2019.**

131. Tejassvi, E. Hari Mohan; Neha Y. Hebalkar; A. Jyothirmayi, B.V. Sarada, S. Anandan, Krishna Mohan Mantravadi, **Tata N Rao**, "Flexible and free-standing carbon nanofiber matt derived from electrospun polyimide as an effective interlayer for high performance Lithium Sulfur batteries" *J. Material Science***,** 54, 9075, **2019**.

132. Nanaji, K., Upadhyayula, V., **Tata N. Rao**, Anandan, S., Robust, Environmentally Benign Synthesis of Nanoporous Graphene Sheets from Biowaste for Ultrafast Supercapacitor Application, *ACS Sustainable Chemistry and Engineering*, 7, 2516-2529, **2019**.

133. Mandati, S., Misra, P., Sarada, B.V., **Tata N. Rao,** Copper Chalcopyrites for Solar Energy Applications *Transactions of the Indian Institute of Metals*, 72 (2) (2019) 271-288.

134. Anas, N.S., Ramakrishna, M., Dash, R.K., **Tata N. Rao,** Vijay, R., Influence of process control agents on microstructure and mechanical properties of Al alloy produced by mechanical alloying, *Materials Science and Engineering A*, 751 (2019) 171-182.

135. Padya, B., Narasaiah, N., Jain, P.K., **Tata N. Rao,** A facile co-solvent strategy for preparation of graphene nanoplatelet powder: An industrially viable innovative approach *Ceramics International*, 45 (10) (2019) 13409-13413.
136. Nanaji, K., **Tata N**. **Rao,** Varadaraju, U.V., Anandan, S., Pore Size-Engineered Three-Dimensional Ordered Mesoporous Carbons with Improved Electrochemical Performance for Supercapacitor and Lithium-ion Battery Applications, *ChemistrySelect*, 4 (2019) 10104-10112.

137. Anas, N.S., Chandrasekhar, S.B., Dash, R.K., **Tata N. Rao,** Vijay, R., Effect of Carbon Nanotubes on Solution Treatment Temperature and Dissolution Characteristics of Precipitates in Al Alloy Produced by High-Energy Milling and Hot Extrusion *Transactions of the Indian Institute of Metals*, 72 (10) (2019) 2687-2697.

138. Kali, R., Padya, B., Tata N. Rao, Jain, P.K. Solid waste-derived carbon as anode for high performance lithium-ion batteries, *Diamond and Related Materials*, 98 (2019) art. no. 107517.

139. Vijayakumar, M., Bharathi Sankar, A., Sri Rohita, D., **Tata N**. **Rao,** Karthik, M., Conversion of Biomass Waste into High Performance Supercapacitor Electrodes for Real-Time Supercapacitor Applications, *ACS Sustainable Chemistry and Engineering*, 7 (20) (2019) 17175-17185.

140. Haridas, A.K., Jyothirmayi, A., Sharma, C.S., **Tata N**. **Rao,** Synergic effect of nanostructuring and excess Mn3+ content in the electrochemical performance of Li4Ti5O12-LiNi0.5Mn1.5O4 Li-ion full-cells, *Journal of Materials Research*, 35 (1) (2020) 42-50.

141. Bharti, V., Gangadharan, A**., Tata N**. **Rao,** Sharma, C.S., Carbon soot over layered sulfur impregnated coconut husk derived carbon: An efficient polysulfide suppressor for lithium sulfur battery, *Materials Today Communications*, 22 (2020) art. no. 100717.

142. Nanaji, K., **Tata N. Rao,** Varadaraju, U.V., Anandan, S., Jute sticks derived novel graphitic porous carbon nanosheets as Li-ion battery anode material with superior electrochemical properties, *International Journal of Energy Research*, 44 (3) (2020) 2289-2297.

143. Hembram, K., **Tata N**. **Rao,** Ramakrishana, M., Srinivasa, R.S., Kulkarni, A.R., Influence of CaO doping on phase, microstructure, electrical and dielectric properties of ZnO varistors, *Journal of Alloys and Compounds*, 817 (2020) art. no. 152700.

144. Gupta, H., Mothkuri, S., McGlynn, R., Carolan, D., Maguire, P., Mariotti, D., Jain, P.K., **Tata N. Rao,** Padmanabham, G., Chakrabarti, S., Activated Functionalized Carbon Nanotubes and 2D Nanostructured MoS2 Hybrid Electrode Material for High-Performance Supercapacitor Applications, *Physica Status Solidi (A) Applications and Materials Science*, 217 (10) (2020) art. no. 1900855.

145. Gangadharan, A., Mamidi, S., Sharma, C.S., **Tata N**. **Rao,** Urea-modified candle soot for enhanced anodic performance for fast-charging lithium-ion battery application, *Materials Today Communications***,** 23 (2020) art. no. 100926.
146. Mandati, S., Misra, P., Boosagulla, D., **Tata N. Rao,** Sarada, B.V., Economic pulse electrodeposition for flexible CuInSe2 solar cells, *Materials for Renewable and Sustainable Energy*, 9 (3) (2020) art. no. 19.

147. Usha Rani, M., Nanaji, K., **Tata N**. **Rao,** Deshpande, A.S., Corn husk derived activated carbon with enhanced electrochemical performance for high-voltage supercapacitors**,** *Journal of Power Sources*, 471 (2020) art. no. 228387.

148. Madhurima, V.P., Borse, P.H., Kumari, K., **Tata N**. **Rao,** Jain, P.K., Improved photocatalytic activity of carbon-based polymeric semiconductor for efficient decontamination of wastewater: Effect of reaction atmosphere and pyrolysis temperature, *Optical Materials*, 110 (2020) art. no. 110523

149. Hari Mohan, EH, Nanaji, K., Anandan, S, Rao, BVA, **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*, 55 (2020) 16659-16673.

150. Mitravinda T., Karthik M.' Anandan S.' Sharma C.S., and **Tata N. Rao**, Fabrication of biowaste derived carbon-carbon based electrodes for high-performance supercapacitor applications, *Indian Journal of Engineering and Materials Sciences*, 27 (6) (2020) 1080 – 1090.

151. B.V. Sarada, R. Vijay, R. Johnson, **Tata N. Rao** and G. Padmanabham, Fight Against COVID-19: ARCI's Technologies for Disinfection, *Transactions of The Indian National Academy of Engineering*, Invited Article (2020) 349-354.

152. P. Samhita, K. Nanaji, S. Mandati, **Tata N. Rao**, S. K. Martha and B.V. Sarada, Electrodeposited NCO Nanosheets with Oxygen Vacancies: An Efficient Electrode Material for Hybrid Supercapacitors, *Batteries and Supercapacitors*, 2020, 3, 1209–1219.

153. Vijayakumar, M, Bharathi Sankar A., Rohita, D., Nanaji K., **Tata N. Rao**, Achieving High Voltage and Excellent Rate Capability Supercapacitor Electrodes Derived From Bio-renewable and Sustainable Resource, *Chemistry Select*, 5: 28 (2020) 8759-8772.

154. Balaji Padya, N Ravikiran, Ravi Kali, N Narasaiah, PK Jain, **Tata N. Rao**, Multifunctional surface-modified ultrathin graphene flakes for thermal and electrochemical energy storage application, Materials Today Proceedings, 26 (2020) 52.

155. S. Sudhakara sarma Sreedhara JoydipJoardar, VijayRavula, Tata N. Rao, Preparation and characterization of nanoboron by cryo-milling, *Advanced Powder Technology*, 31 (2020) 3824.

156. Challagulla, N. V., Vijayakumar, M., Rohita, D. S., Elsa, G., Sankar, A. B., **Tata N. Rao** and Karthik, M, Hierarchical Activated Carbon Fibers as a Sustainable Electrode and Natural Seawater as a Sustainable Electrolyte for High-Performance Supercapacitor, *Energy Technology*, 8:9 (2020)

157. Reddy, K.M., Zou, X., Hu, Y., Zhang, H., **Tata N. Rao**, Joardar, J., Influence of heating rate on formation of nanostructured tungsten carbides during thermo-chemical processing**,** *Advanced Powder Technology*, 32 (1) (2021) 121-130.

158. Mamidi, S., Gangadharan, A., Pathak, A.D., **Tata N**. **Rao,** Sharma, C.S., A Three-Dimensional Hybrid Carbon-Microelectromechanical System on a Graphite-Coated Stainless Steel Substrate as a High-Performance Anode for Lithium-Ion Batteries, *ACS Applied Energy Materials* 4 (1) (2021) 545-553.

159. Hembram, K., **Tata N. Rao,** Srinivasa, R.S., Kulkarni, A.R., CaO doped ZnO–Bi2O3 varistors: Grain growth mechanism, structure and electrical properties, *Ceramics International*, 47 (1) (2021) 1229-1237.

160. Dileep K, R., Rajbhar, M.K., Ashina, A., Ramasamy, E., Mallick, S**., Tata N**. **Rao,** Veerappan, G. A facile co-precipitation method for synthesis of Zn doped BaSnO3 nanoparticles for photovoltaic application, *Materials Chemistry and Physics***,** 258 (2021) art. no. 123939.

161. Misra, P., Atchuta, S.R., Mandati, S., Sarada, B.V., **Tata N**. **Rao,** Sakthivel, S;, A non-vacuum dip coated SiO2 interface layer for fabricating CIGS solar cells on stainless steel foil substrates, *Solar Energy*, 214 (2021) 471-477.

162. Mitravinda, T., Anandan, S., Sharma, C.S., **Tata N**. **Rao,** Design and development of honeycomb structured nitrogen-rich cork derived nanoporous activated carbon for high-performance supercapacitors, *Journal of Energy Storage*, 34 (2021) art. no. 102017.

163. P. Misra, S. Mandati, **Tata N. Rao** and B.V. Sarada, A multi-layer Cu-In-Ga precursor sputtering approach for improving structural quality of selenized CIGS absorber layer, *Materials Today Proceedings*, 39 (2021) 2037-2041.

164. S. Mandati, P. Misra, B. Divya, **Tata N. Rao,** and B. V. Sarada, Solar Energy Harvesting through Photovoltaic and Photoelectrochemical means from Appositely Prepared CuInGaSe2 Absorbers by Low-cost and Environmentally Benign Pulse Electrodeposition Technique, *Industrial & Engineering Chemistry Research (ACS)*, 28 (12) (2021) 15123-15129**.**

165. Nanaji, Katchala, Sarada, B. V., Varadaraju, U. V., **Tata N. Rao** and Anandan, Srinivasan, A novel approach to synthesize porous graphene sheets by exploring KOH as pore inducing agent as well as a catalyst for supercapacitors with ultra-fast rate capability**,** *Renewable Energy***,** 172 (2021) 502-513

166. Mandati, S., Misra, P., Boosagulla, D., **Tata N. Rao,** Sarada, B.V., Control over MoSe2 formation with vacuum-assisted selenization of one-step electrodeposited Cu-In-Ga-Se precursor layers, *Environmental Science and Pollution Research*, 28 (2021) 15123-15129.

167. Mamidi, Suresh, Pandey, Alok K., Pathak, Anil D. **Tata N. Rao** and C. S. Sarma , Pencil lead powder as a cost-effective and high-performance graphite-silica composite anode for high performance lithium-ion batteries, *Journal of Alloys and Compounds*, Volume 872, 2021, Article number 159719

168. Sreekanth Mandati, Easwaramoorthi Ramasamy, S Mallick, **Tata N Rao**, Ganapathy Veerappan, Rapid assessment of photovoltaic activity of perovskite solar cells by photoluminescence spectroscopy, *Materials Letters*, 299 (2021) 130056.

169. Dileep K R, Mandati S, Ramasamy E, Mallick S., **Tata N. Rao**, Veerappan G, Rapid assessment of photovoltaic activity of perovskite solar cells by photoluminescence spectroscopy, *Materials Letters*, 299 (2021) Article number 130056.

170. Pavan S. V., Nanaji K., Anandan S., Pramanik M., Krishnamurthy N. S., Ravi B. and **Tata N. Rao**, Petrolium coke as an efficientsingle carbon source for high-energy and high-power Lithium-ion capacitors, *Energy and Fuels*, 35(10) (2021) 9010-9016.

171. Sagar Mothkuri, Honey Gupta, Pawan K. Jain, **Tata Narsinga Rao**, Gade Padmanabham, Supriya Chakrabarti, Functionalized Carbon Nanotube and MnO_2 Nanoflower Hybrid as an Electrode Material for Supercapacitor Application, *Micromachines* 2021, *12*(2), 213.

172. Samhita P., **Tata N. Rao**, Surendra Martha**,** Sarada, B. V., Electrodeposited MnO2 based Redox Mediator Driven 2.2 V High Energy Density Aqueous Supercapacitor, *Energy*, 243 (2022) 122571.

173. Samhita P., Anandan, S., **Tata N. Rao**, Martha, S. K. Sarada B. V., High-Performance Supercapacitor with Electrochemically Exfoliated GO Incorporated NiCo2O4 in Aqueous and Non-Aqueous Electrolytes, *J Energy Storage*, 50 (2022) 104598.

174. Boya Venugopal, Parakandy Muzhikara Pratheeksha, Khasim Saheb Bayikadi, Pavan Srinivas Veluri, Mantripragada Rama Krishna, Bulusu Venkata Sarada, Tata Narasinga Rao, Paul Joseph Daniel and Srinivasan Anandan, Oxygen vacancies enable excellent electrochemical kinetics of carbon coated mesoporous SnO2 nanoparticles in lithium ion batteries, Mater. Adv., 3 (2022) 1617.

175. Sadananda Muduli, Samhita Pappu, Sarada V. Bulusu, Tata N. Rao, Surendra K. Marth, Electrochemically Exfoliated Layered Carbons as Sustainable Anode Materials for Lead Carbon Hybrid Ultracapacitor, ChemElectroChem,, https://doi.org/10.1002/celc.202200230, 2022.

176. Harimohan, Erabhoina, Nanaji, Katchala, 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*, 46 (2022) 4339.

177. S Praveen Kumar, Balla Rekha Madhuri, Katchala Nanaji, Srinivasan Anandan, **Tata N. Rao,** Ramkrishna Sahoo, Facile surface engineering of bio-waste derived amorphous carbon with SnO2 nanowires to enhance the efficacy of Li/Na storage, *Energy Advances*, 1 (2022) 205.

Review Articles:

178. A. Fujishima and **Tata N. Rao**, "Recent advances in heterogeneous TiO_2 photocatalysis" *Proc. Indian Acad. Sci. (Chem. Sci.)* 109 (1997) 471.
179. A. Fujishima and **Tata N. Rao**, "Interfacial photochemistry: fundamentals and applications" *Pure & Appl. Chem*., 70 (1998) 2177.
180. **Tata N. Rao**, A. Fujishima, "Recent advances in electrochemistry of diamond" *Diamond and related materials,* 9 (2000) 384.
181. A. Fujishima, **Tata N. Rao**, and D. A. Tryk, "Titanium dioxide photocatalysis" *J. Photochem. Photobiol. C: Photochem. Reviews,* 1(2000) 1. **Cited: 9886 (Google scholar).**
182. A. Fujishima, C. Terashima, K. Honda, B. V. Sarada, and **Tata N. Rao**, "Recent Progress in Electroanalytical Applications of Diamond Electrodes" *New Diamond and Frontier Carbon Technology,* 12 (2002) 73.
183. G. Sundararajan and **Tata N. Rao**, "Commercial prospects for nanomaterials in India, Journal of Indian Institute of Science" *J. Indian Institute of Science*, 89 (2009) 35.
184. G. Sundararajan and **Tata N. Rao**, Nanomaterials: Application development at ARCI, *Nano Digest,* 2 (2010) 44.
185. **Tata N. Rao**, and Raju Prakash: Nano Batteries: Future of Automotive Transportation, *Nano Digest,* 4 (2013) 28.
186. S. Sakthivel, M. Karthik and **Tata N. Rao**, Nanotechnology for concentrated solar thermal applications, *Nanotech Insights*, 7 (2016) 43
187. Sahoo R., Singh M. and **Tata N. Rao**, A Review on the Current Progress and Challenges of 2D Layered Transition Metal Dichalcogenides as Li/Na-ion Battery Anodes, *ChemElectroChem*, 8 (2021) 2358.

Book chapters

1. **Tata N. Rao**, D. A. Tryk and A. Fujishima, "Applications of TiO_2 Photocatalysis" *Encyclopedia of Electrochemistry, Volume 6: Semiconductor Electrodes and Photoelectrochemistry,* Wiley-VCH, Eds. A.J. Bard and M. Stratmann, March 2002.

2. A. Fujishima, Y. Ohko and **Tata N. Rao**, "Photoelectrochemical Processes of Semiconductors," in "Photocatalysis Fundamentals and Applications," edited by M. Kaneko and I. Ohkura (2001).

3. Sarada B V, Terashima, C, Ivandini, A., **Tata N. Rao**, Fujishima, A, "Diamond Electrochemistry", Elsevier B V, 2005

4. Olivia, H, Sarada, B V, **Tata N. Rao**, Fujishima, A, "Diamond Electrochemistry", Elsevier B V, 2005

5. G. Sundararajan and **Tata N. Rao**, "Current trends in nanomaterials research technology development and commercialization" Platinum Jubilee issue of Indian National Science Academy (INSA), 2009

6. Nanomanufacturing for Aerospace Applications, S. Anandan, H. Neha, B. V. Sarada, **Tata N. Rao**, *Aerospace Materials and Technologies*, Edited by: **Prasad**, N. Eswara,

Wanhill, R. J. H, Volume 2, 2016. Pp85.

7. A Chapter on "Bandgap Engineering as a Potential Tool for Quantum Efficiency Enhancement" authored by Reddy Kunda Siri Kiran Janardhana, Raju Kumar, Tata Narsinga Rao and Srinivasan Anandan in the "Nanaostructured Materials for Environmental Applications" (ed.) Subramanian Balakumar, Valérie Keller, M.V.Shankar, Springer Nature, 2021 (Page number not yet assigned).
8. Surendra K. Martha, Samhita Pappu, Bulusu V. Sarad, **Tata N. Rao**, A chapter on "Concept of Thermodynamic Studies in Electrochemical Storage and Conversion Systems", in the book on Encyclopedia of Energy Storage, (ed.) volume 1, ISBN: 9780128197301, p 264-274, 2022.

Book edited:

1. Diamond Electrochemistry: Edited by A. Fujishima, Y. Einaga, **T. N. Rao** and D.A. Tryk, Co-published by Elsevier B.V. and BKC INC; Published in 2005

(VIII) Patents

1. Analysis method using liquid chromatograph. **WO0167089A1**
2. Detection method of inspection compound, and diamond electrode and device used therefore. **JP2003121410A2**
3. Diamond electrode for measuring concentration of glucose and measuring method and instrument using the same. **JP2002310977A2, AU0188106A5, WO0225261A1**
4. Electrochemical assay using an electroconductive diamond-coated electrode, and electrochemical assay system based thereon. **EP1055926A2, EP1055926A3, TW0528867B**
5. Method for determining concentration of xanthin type compound and sensor for use therein. **WO0198766A1, AU0174581A5**
6. Thiol concentration measuring method and sensor used for the same, **JP2002189016A2**

Patents during ARCI, Indian service

Indian Patents Granted

S.N	Title of Patent	Name of Inventors	Patent Number	Date of Grant	Patent Application Number	Date of filing
1.	An Improved Process for the Preparation of Doped Zinc Oxide Nanopowder useful for the Preparation of Varistors	Kaliyan Hembram Tata Narasinga Rao R. Sundaresan	**254913**	03/01/2013	1669/DEL/2006	20/07/2006
2.	Improved Method of Producing Highly Stable Aqueous Nano Titania Suspension	Neha Hebalkar T. Narasinga Rao	282988	28/04/2017	730/DEL/2009	09/04/2009

S.N	Title of Patent	Name of Inventors	Patent Number	Date of Grant	Patent Application Number	Date of filing
3.	A Process for the Preparation of Nanosilver and Nanosilver-Coated Ceramic Powders	K. Murugan T. Narasinga Rao	284812	30/06/2017	2786/DEL/2005	19/10/2005
4.	Improved Process for the Preparation of Stable Suspension of Nano Silver Particles having Antibacterial Activity	J. Revathi Neha Hebalkar T. Narasinga Rao	289543	14/11/2017	1835/DEL/2010	04/08/2010
5.	Improved process for the preparation of bi-functional silica Particles useful for antibacterial and self cleaning surfaces	Neha Hebalkar Tata Narasinga Rao	291408	04/01/2018	3071/DEL/2010	22/12/2010
6.	An Improved Method for Producing ZnO Nanorods	Kaliyan Hembram D. Sivaprahasam Tata Narasinga Rao	293775	05/03/2018	2759/DEL/2010	19/11/2010
7.	An Improved Process for Preparing Nanotungsten Carbide Powder useful for Fuel Cells	K.S. Dhathathreyan N. Rajalakshmi T. Narasinga Rao	303338	22/11/2018	81/DEL/2007	12/01/2007
8.	An Improved Method of Preparing Porous Silicon Compacts	Dibyendu Chakravarty B.V. Sarada Tata Narasinga Rao	304349	12/12/2018	912/DEL/2011	31/03/2011
9.	Novel Copper Foils having High Hardness and Conductivity and a Pulse Reverse Electrodeposition Method for their Preparation	B.V. Sarada C.L.P. Pavithra M. Ramakrishna T. Narasinga Rao	306501	29/01/2019	1028/DEL/2009	19/05/2009
10.	A Process for Preparing Nanocrystalline Olivine Structure Transition Metal Phosphate Material	Dinesh Rangappa R. Gopalan Tata Narasinga Rao	310620	31/03/2019	405/DEL/2012	14/02/2012
11.	An Improved Process for Preparation of Nanosilver Coated Ceramic Candle Filter	J. Revathi K. Murugan Tata Narasinga Rao	327532	17/12/2019	1249/DEL/2011	28/04/2011
12.	Method of Producing Multifunctional Self Assembled Mixed Phase Titania Spheres	Neha Y Hebalkar T N Rao	335724	22/04/2020	3777/DEL/2014	19/12/2014
13.	Methods of preparation of high Performance ZnO varistors and improved compositions	Kaliyan Hembram Tata N. Rao Raman S. Srinivasa Ajit R. Kulkarni	339072	22/06/2020	2765/DEL/2015	03/09/2015

S.N	Title of Patent	Name of Inventors	Patent Number	Date of Grant	Patent Application Number	Date of filing
14.	Method Of Producing Nano Structured C-TIO_2 Composite Material For Visible Light Active Photocatalytic Self-Cleaning Applications	Dr. S. Sakthivel Dr. S. Anandan Dr. T.N. Rao	340592	06/07/2020	201811011478	28/03/2018
15.	A method of producing high performance lithium titanate anode material for lithium ion battery applications	S. Anandan, P.M. Pratheeksha, R. Vijay Tata N. Rao,	365560	28/04/2021	201711006147	21/02/2017
16.	Method of producing graphene like structured nanoporous carbon material from Jute stick based bio-waste for Energy Storage applications and the product thereof	S. Anandan K. Nanaji Tata N Rao	394477	07/04/2022	201711006697	24/02/2017

Indian Patents Awaiting Grant

S.N	Title of Patent	Name of Inventors	Patent Application Number	Date of filing
1.	Novel Ceramic Materials Having Improved Mechanical Properties and Process for their Preparation	Dibyendu Chakravarty Tata Narasinga Rao R. Sundaresan	3396/DEL/2005	19/12/2005
2.	An Improved Process for the Preparation of Stable Nano Silver Suspension having Antimicrobial Activity	J Revathi N Satya Moulika A Venkata Sai Atul Suresh Deshpande K Murugan Neha Yeshwanta Hebalkar R Vijay Tata Narasinga Rao G Sundararajan	201611027145	09/08/2016
3.	An Improved Process of Carbon - Metal Oxide Composites Prepared by Nano Casting of Wood and the Product Thereof	J. Revathi Atul Suresh Deshpande Tata Narasinga Rao	201611034531	07/10/2016
4.	Process for producing the nano Boron by cryo-milling	S. Sudhakara Sarma R. Vijay T.N. Rao	201911025690	27/06/2019
5.	Method of Producing Nanoporous Graphene Sheetlike Structured High and Low Surface Area Carbon Sheets from Petroleum Coke	K. Nannji Pavan Srinivas V Srinivasan Anandan Tata N Rao Narayanan Krishnamurthy Ramachandra Rao Bojja Malay Pramanik	202011100739	20-02-2020
6.	METHOD OF PRODUCING POROUS PARTICLES-FIBERS CARBON COMPOSITE MATERIAL FOR SUPERCAPACITOR	Mani Karthik R. Vijay T.N. Rao	202011027265	26/06/2020

S.N	Title of Patent	Name of Inventors	Patent Application Number	Date of filing
	APPLICATIONS AND THE PRODUCT THEREOF			
7.	Method of producing in-situ carbon coated lithium iron phosphate cathode material for Li-ion Batteries and the product thereof	S. Anandan R. Vijay Tata N Rao	202011056608	28/12/2020

International Patents Granted & Awaiting Grant

S.No	S.No country wise	Title of Patent	Name of Inventors	Country	Patent Number / Application Number	Date of Grant	Date of filing with patent office
1.	1.	A Process for the Preparation of Nano Silver and Nano Silver-Coated Ceramic Powders	K. Murugan; T. Narasinga Rao	South Africa	2006/8591	30/04/2008	13/10/2006
	2.			Sri Lanka	14258	02/11/2011	17/10/2006
	3.			Indonesia	IDP000044402	06/02/2017	18/10/2006
2.	4.	Improved Process for the Preparation of Stable Suspension of Nano Silver Particles having Antibacterial Activity	J. Revathi; Neha Hebalkar; Tata N. Rao	United Kingdom	GB2496089	18/06/2014	19/07/2011
3.	5.	A method of producing high performance lithium titanate anode material for lithium ion battery applications	S. Anandan P.M. Prateeksha R. Vijay Tata N Rao	Japan	2019-520394	-	16/04/2019
	6.			Germany	112018000205.5	-	14/08/2019
	7.			USA	**11001506**	11/05/2021	22/05/2019
	8.			China	**IIC190527**	01/12/2021	22/07/2019
	9.			Korea	10-2019-7019218	-	25/10/2019