

## CV of Dr.N.Rajalakshmi

1. **Name :** N.Rajalakshmi  
**ORCID id:** [orcid.org/ 0000-0001-7926-8111](https://orcid.org/0000-0001-7926-8111)  
**https://www.researchgate.net/profile/N\_Rajalakshmi**
2. **Designation:** Senior Scientist and Team leader
3. **Contact Details:** Centre for Fuel Cell Technology ARCI, IIT Madras Research Park, 6, Kanagam road, Taramani, Chennai 600113, India, email: [rajalakshmi@arci.res.in](mailto:rajalakshmi@arci.res.in), 98411 88467
4. **Academic qualifications:**  
**B.Sc Physics** – Madras University , 1980 – I class – 86%  
**M.Sc Physics** – Annamalai University , 1982 - I class – 62%  
**Ph.D Physics**- IIT Madras, 1987  
**M.B.A** - Alagappa University – 2005 I class
5. **Post doctoral programme :** TH Darmstadt, Germany, University of Switzerland, Geneva- 1987-2004
6. **Current Fields of Research Interest**
  - **Fuel cell systems**  
PEM Fuel Cell
    - ❖ Fuel cell Electrode Nanoelectrocatalysts
    - ❖ Low cost fuel cell components
      - Bipolar plates,
      - Non Noble Metal Catalyst
    - ❖ Combined water and Thermal Management
    - ❖ Fuel cell control
    - ❖ Power converters
    - ❖ Fuel cell stacks –
      - Flow field design development , Stack design development , Stack Testing and Analysis
    - ❖ Fuel cell systems
      - Development of PEMFC system for stationary applications,
      - Development of PEMFC system for Transport applications
  - **Hydrogen storage**
    - Metal Hydrides
    - Carbon based Materials
  - **Batteries**
    - Li Batteries, Supercapacitors, Metal air batteries
7. **Projects**
  - NIMITLI- Fuel cells for distributed power 5 kW –Team Member– CSIR -2001-2003
  - Hydrogen storage in carbon nanotubes- DST – Project coinvestigator 2001-2003
  - CFCT Phase 1 – Team member –Fuel cells – (2004-2009)
  - Electrochromism in Metal hydrides Project investigator - DST – 2004-2007
  - CFCT Phase 2 – Team Member – Fuel cells - (2009- 2014)
  - MNRE –CoInvestigator – Hydrogen storage – (2009- 2015)

- Indo-UK (DST-EPSRC) – Project lead Investigator- Fuel cells for commercialization jumping the hurdles (Three UK and Three Indian Institutes) – (2011- Ongoing)
- Indo-Japan –JSPS – 2014 – Completed
- Development of Zn-Air batteries – DST – 2015-On going (CoPI)
- Demonstration of 5 KW PEMFC system at GAIL R & D facility, New Delhi 2017 – completed
- Demonstration of 5 kW PEMFC system at NLC, Neyveli- 2016 - Completed
- Development of metallic bipolar plates for PEMFC - DST –Ongoing
- Synthesis of AlH<sub>3</sub> as solid propellant –DRDO-Ongoing
- Development of ECMR for Hydrogen generation- 2016- Ongoing
- Technical research centre 2016-ongoing , CoPI

## **8. Achievements**

Worked in Technology Demonstration of PEMFC for stationary applications funded by DST,

Involved in the development of 1 kW GIPS system (2006),

Involved in the development of 3 kW GIPS system (2007)

Involved in the development of 5 kW GIPS system (2009)

Involved in the development of 10 kW GIPS system (2010)

Involved in the development of 20 kW GIPS system (2012)

Worked in Technology Demonstration of PEMFC for Transport applications –

Demonstrated a 3 kW PEMFC power pack in a Bijlee vehicle (Mahindra) – 2009

Demonstrated a 5 kW PEMFC power pack in a Bijlee vehicle (Mahindra) – 2012

Working in Many R & D projects

Development of fuel cell electrodes

Development of catalysts

Development of supercapacitors

Development of metal air batteries, Li batteries

Modelling studies for flow distribution, Power conditioners, emulators, system optimization(Hydrogen recirculation, Online humidification,CHPetc),statistical analysis

## **9. Patents - 22 Annexure 1**

## **10. Publications: 120 Annexure 2**

## **11. Peer Recognition**

- Reviewer for many DST, MNRE projects
- Referee for
  - Journal of Physical Chemistry,
  - ACS
  - International Journal of Hydrogen Energy ,
  - Journal of New materials for Electrochemical systems ,
  - Journal of power sources,
  - Carbon,
  - Book “ Fundamentals of Electrochemical Deposition” by John Wiley publishers, J ECS series
- Scientific committee member for second ASME International conference on Fuelcell science, Engineering and Technology, 2003, Rochester, NewYork
- Member of the Advisory Panel in
  - Nanotechnology and Nanobiotechnologyworkshop ,
  - Member of the Advisory Panel in “ Current Trends in Nanotechnology” conference

- Panel Member in International conference in Renewable energy , Anna University 2010,
- Panel member in Science city during Science day celebrations, 2011, Hydrogen energy
- Chaired a session in
  - ASME conference at Ypsilanti USA during 2005
  - SAE 2010, Alternative fuels, Chennai
  - NIT Suralkal, 2010, Recent trends in Chemical and Analytical methods,
  - Delhi University, Nov 2012, during Indo-German workshop,
  - IIT Madras Sep 2012, during ANM 2012
- Given 45 invited talks in various National and International conferences
- Gave series of lectures on Fuel cells at
  - IIT Madras, India (2006)
  - Kaust, Saudi Arabia (2010) for Undergraduate students
  - KRICT, South Korea, 2003
  - IIT Madras , vel Tech, science city, VIT (2012)
- Presented 20 papers in National Conferences
- Attended the prestigious GRC conference on Fuel cells by Invitation (2007, 2009 and 2010) and participated in the rapid discussion section, Rhode Island, USA
- Presented the inaugural lecture as Chief Guest in two National conferences 2008, 2010

## **12. Membership of Professional Bodies**

Member of Materials Research Society of India

Member of The International society for Fuel cell Technology

American Chemical society, USA

Electrochemical society, USA

## **13. Number of M.Tech/Ph.D students guided :**

50( 1, completed , 5 Ph.D on going)

## **Annexure 1 Patents**

1. A porous electrode for use in Electrochemical cells Application No. 286/MAS/2001
2. A method of rendering porous graphite plates impervious to fluids, Application No. 326/MAS/2001
3. A device for surface polishing of graphite plates, Application No. 396/MAS/2001
4. Flow field design for fuel cells Application No. 554/MAS/2001
5. An improved process for the preparation of exfoliated graphite separator plates useful in fuel cells, the plates prepared by the process and a fuel cell incorporating the said plates

### **GRANTED**

**Patent No.281504 (1206/DEL/2006), Dated 17/05/2006, granted on dated 20/03/2017**

6. An improved test control system useful for fuel cell stack monitoring and controlling, Appl.No.1989/DEL/2006, Complete specification filed on 12<sup>th</sup> Jan 2007
7. An improved process for preparing nano tungsten carbide powder useful for fuel cells, - Appl.No. 81/DEL/2007
8. An improved fuel cell having enhanced performance .Appl.No. 606/DEL/2007,
9. Electrochromic material based on Misch metal substituted alloy hydrides Appl No. No:668/CHE/2007 ( with IIT-M)
10. Improved electrode membrane assembly and a method of making the assembly ApplNo. 631/del/2008

**GRANTED 290765, Application No. : 631/DEL/2008, Date of Filing : 13/03/2008, 18.12.2017**

11. An Improved catalyst ink useful for preparing gas diffusion electrode and an improved PEM fuel cell , application No. 680/DEL/2008 filed on 18.3.2008

**GRANTED REF:- Patent No.277778 (680/DEU2008), Dated 18/03/2008 Granted On Dated 30.12.2016**

12. An improved gas flow field plate for use in polymer electrolyte membrane fuel cells (PEMFC)" , Patent Application No .: 2339/DEL/2008, dated 13/10/2008.
13. AN IMPROVED GAS AND COOLANT FLOW FIELD PLATE FOR USE IN POLYMER ELECTROLYTE MEMBRANE FUEL CELLS (PEMFC).2010
14. A DEVICE FOR, AND A METHOD OF, COOLING FUEL CELLS
15. Electronically and ionically conducting multi layer fuel cell electrode and a method for making the same
16. Enhanced Thermal management system for Fuel Cell applications using Nanofluid Coolant
17. Fuel cell system equipped with oxygen enrichment system using magnet
18. A polymer electrolyte membrane (PEM) cell and a method of producing hydrogen from aqueous organic solutions in pulse current mode. No 3313/del/2012 dated 29<sup>th</sup> oct 2012
19. A method of preparation of platinum nano particle catalyst supported on carbon in tubular flow reactor via polyol process (With Patent Lawyer)
20. High temperature polymer electrolyte membrane fuel cells with exfoliated graphite based bipolar plate 494/DEL/2014 dt 20.2.14

21. A polymer Electrolyte Membrane (PEM) cell and a method of producing hydrogen from aqueous organic solutions in pulse current mode, Indian patent No. 3313/DEL/2012
22. Exfoliated graphite separator based electrolyser for hydrogen generation, Indian patent No. 3073/DEL/2013

## **Annexure 2 - Publications**

1. Mechanistic modeling of electrochemical charge transfer in HT-PEM fuel cells, Anusree Unnikrishnan, N. Rajalakshmi, Vinod M. Janardhanan, *Electrochimica Acta* 261 (2018) 436-444
2. Nitrogen doped mesoporous carbon supported Pt electrocatalyst for oxygen reduction reaction in proton exchange membrane fuel cells, J.A. Prithi, N. Rajalakshmi, G. Ranga Rao, *International Journal of Hydrogen Energy*, In press, corrected proof, Available online 19 December 2017
3. Influence of ethyl acetate as a contaminant in methanol on performance of Electrochemical Methanol reformer for hydrogen production, Narreddula Manjula, R. Balaji, K. Ramya, K.S. Dhathathreyan, N. Rajalakshmi and A. Ramachandraiah, *International Journal of Hydrogen Energy*, Volume 43, 2018, Pages 562-568
4. Mesoporous Platinum as sulfur-tolerant catalyst for PEMFC cathodes, J. A. Prithi & N. Rajalakshmi & K. S. Dhathathreyan, *J Solid State Electrochem* DOI 10.1007/s10008-017-3686-0, 2017
5. Studies on PEMFC Stack for SO<sub>2</sub> Contamination at Air Cathode, J. A. Prithi<sup>1</sup>, B. Sasank Viswanath, N. Rajalakshmi, K. S. Dhathathreyan, DOI: 10.1002/fuce.201600118, *Fuel cells*, 2017
6. Synthesis and characterization of activated carbon from jute fibres for hydrogen storage, T. Ramesh, N. Rajalakshmi and K.S. Dhathathreyan, *Renewable energy and environmental sustainability*, 2017, In press
7. Fuel cell Technology – Clean energy, *Electrical journal* July 2016, N. Rajalakshmi
8. Activated carbons derived from tamarind seeds for hydrogen storage, T. Ramesh, N. Rajalakshmi, K.S. Dhathathreyan, *J Energy Storage*, 4 (2015) 89–95
9. Porous Carbon Nanomaterial from Corn cob as Hydrogen Storage Material, N. Rajalakshmi, B. Yamini Sarada, and K. S. Dhathathreyan, *Adv Porous Materials*, 2 (2014) 1–6
10. Recovery of Polymer Electrolyte Fuel Cell exposed to sulfur dioxide, Biraj Kumar Kakati, Anusree Unnikrishnan, Natarajan Rajalakshmi, RI Jafri, KS Dhathathreyan, Anthony RJ Kucernak, *IJHE* (2016) 1–7
11. Nitrogen Doped Graphene as Catalyst Support for Sulfur Tolerance in Polymer Electrolyte Membrane Fuel Cells, Prithi Jayaraj, R. Imran Jafri, N. Rajalakshmi\*, and K. S. Dhathathreyan, *GRAPHENE*, 2, 1–5, 2014
12. Effect of binders on the graphene based anode in Li-ion rechargeable battery, Sanju Rani<sup>1</sup>, N. Rajalakshmi<sup>1</sup>, R. Vedarajan, Noriyoshi Matsumi and K. S. Dhathathreyan, *Graphene* (In Press)
13. Performance analysis of polymer electrolyte membrane (PEM) fuel cell stack operated under marine environmental conditions, B. Viswanath Sasank, N. Rajalakshmi, K. S. Dhathathreyan, *J Mar Sci Technol*, DOI 10.1007/s00773-016-0369
14. A novel reconfigurable hybrid system for fuel cell system, K. Latha, B. Umamaheswari, K. Chaitanya, N. Rajalakshmi, K.S. Dhathathreyan, *IJHE* 40 (2015) 14963–14977
15. Review-Mechanisms and effects of mechanical compression and dimensional change in polymer electrolyte fuel cells, Jason Millichamp, Thomas J. Mason, Tobias P. Neville,

NatarajanRajalakshmi, Rhodri Jervis , Paul R. Shearing , Daniel J.L. Brett, Journal of Power Sources 284 (2015) 305-320

16. Nitrogen doped graphene prepared byhydrothermal and thermal solid state methodsas catalyst supports for fuel cell, R. Imran Jafri , N. Rajalakshmi , K.S. Dhathathreyan ,S. Ramaprabhu, IJHE 40 ( 2015 ) 4337-4348
17. Pt Decorated Free-Standing TiO<sub>2</sub> Nanotube Arrays:Highly Active and Durable Electrocatalyst for OxygenReduction and Methanol Oxidation Reactions, MaidhilyManikandan, Raman Vedarajan, Rajesh Kodiyath, Hideki Abe, Shigenori Ueda, ArivuoliDakshnamoorthy, NatarajanRajalakshmi, Kaveripatnam S. Dhathathreyan, and Gubbala V. Ramesh, J Nanoscience and Nanotechnology, 15, 1–10, 2015
18. K.Latha,Umamaheswari B, Chaitanya K, M, Rajalakshmi N, Dhathatreyan K.S, A Novel Reconfigurable Hybrid System for Fuel Cell System, IJHE (2015)
19. R. Imran Jafri, N. Rajalakshmi , K.S. Dhathathreyan ,and S. Ramaprabhu “ Nitrogen doped graphene prepared by hydrothermal and thermal solid state methods as catalyst supports for fuel cell “ , International Journal of Hydrogen Energy 40 ( 2015 ) 4337-4348
20. Sanju Rani and N. Rajalakshmi , “Effect of Nanotube Diameter on Photo-Electro-Chemical Properties of Carbon Quantum Dot Functionalized TiO<sub>2</sub> Nanotubes “ , Journal of Clean Energy Technologies, Vol. 3, No. 5, 367-371, September 2015
21. PrithiJayaraj, P. Karthika, N. Rajalakshmi, K.S. Dhathathreyan , “Mitigation studies of sulfur contaminated electrodes for PEMFC” , International Journal of Hydrogen Energy 39 ( 2014 ) 12045 – 12051
22. V. SenthilVelan, G. Velayutham, N. Rajalakshmi, K.S. Dhathathreyan, “Influence of compressive stress on the pore structure of carbon cloth based gas diffusion layer investigated by capillary flow porometry “ , International journal of Hydrogen Energy 39 (2014) 1752- 1759
23. Alkali intercalated graphene oxide for high performance supercapacitors, P. Karthika, N. Rajalakshmi and K.S. Dhathathreyan, Graphene, 2013 (In press)
24. A Novel Graphene Based Cathode for Metal-Air Battery, SenthilVelan V, Karthika P, Rajalakshmi N, Dhathathreyan K.S, GRAPHENE, Vol. 1, 1–7, 2013
25. Synthesis and electro-catalytic properties of Platinum supported on graphene towards methanol oxidation- Insight on functionalities and thermal stability of graphene support., P. Karthika, N. Rajalakshmi, K.S. Dhathathreyan, and D. Arivuoli, Journal of Nanoscience and Nanotechnology ( 2014)
26. Analysis of Liquid Water Formation, Distribution and Transport in a PEM Fuel Cell, P.K. Jithesh, R. Arvindvivek, N. Rajalakshmi, KS. Dhathathreyan, T. Sundararajan, SaritK.Das, Journal of Power sources (2014 )
27. Carbon assisted water electrolysis for hydrogen generation, S.Sabareeswaran, R.Balaji,K.Ramya, N.Rajalakshmi and K.S.Dhathathreyan AIP Conf Proceedings, 43, 2013, 1538
28. Investigation Of Various Operating Modes Of Fuelcell/Ultracapacitor/Multiple converter based Hybrid System, K. Latha , B. Umamaheswari , N. Rajalakshmi , K.S. Dhathathreyan, PID
29. Synthesis of mesoporousPt-Ru alloy particles with uniform sizes by sophisticated hard templating method, Chem Asian Journal , 2013 (In press)
30. Hard templating synthesis of mesoporous Pt based alloy particles with low Ni and Co contents , Chemistry Letters, 42, Issue No. 4, 2013 (In press)
31. Flexible Polyester Cellulose Paper Supercapacitor with a Gel Electrolyte, PrasannanKarthika, NatarajanRajalakshmi, and Kaveripatnam S. Dhathathreyan, ChemPhysChem 2013, 14,

32. Efficient Power Conditioner for a Fuel Cell Stack-Ripple Current Reduction Using Multiphase Converter, Sampath Naveen Kumar, NatarajanRajalakshmi\*, KaveripatnamSamban Dhathathreyan, Smart Grid and Renewable Energy, 2013, 4, 53-56
33. Tuning of PEM fuel cell model parameters for prediction of steady state and dynamic performance under various operating conditions, K. Lathaa,S. Vidhya , B. Umamaheswari , N. Rajalakshmi , K.S. Dhathathreyan, Int Journal of hydrogen energy , 2012, 1-7
34. Design and Optimization of a Closed Two Loop Thermal Management Configuration for PEM Fuel Cell Using Heat Transfer Modules, ViswanathSasankBethapudi, Rajalakshmi N., and Dhathathreyan K. S.International Journal of Chemical Engineering and Applications, Vol. 3, No. 4, August 2012
35. Electrochemical Impedance spectroscopy as a diagnostic tool for the evaluation of flow field geometry in polymer electrolyte membrane fuelcells, M.Maidhily,N.Rajalakshmi and K.S.Dhathathreyan, Renewable energy 51,2013,79-84
36. Phosphorus doped ExfoliatedGraphene for Supercapacitor Electrodes, P.Karthika, N.Rajalakshmi and K.S.Dhathathreyan, J Nanoscience and Nanotechnology (2012)
37. Functionalized Exfoliated graphene oxide as supercapacitor electrodes , P.Karthika, N.Rajalakshmi and K.S.Dhathathreyan, Soft nanoscience letters , 2, 2012 , 59-66
38. Forced air breathing PEMFC stacks, K.S.Dhathathreyan, N.Rajalakshmi\*, K.Jayakumar, S.Pandian, Accepted for publication in International Journal of Electrochemistry (2012)
39. Efficient Power conditioner for a fuel cell stack- Ripple Current Reduction Using Multiphase Converter,S.Naveen Kumar, N.Rajalakshmi and K.S.Dhathathreyan, Smart Grid and Renewable Energy, 4, 2013,53-56
40. Novel Platinum–Cobalt Alloy Nanoparticles Dispersed on Nitrogen-Doped Graphene as a Cathode Electrocatalyst for PEMFC Applications, B. P. Vinayan, Rupali Nagar, N. Rajalakshmi, S. Ramaprabhu,Adv. Functional Materials, 2012
41. Design and analysis of a proton exchange membrane fuel cells (PEMFC), S. Pandiyan , A. Elayaperumal , N. Rajalakshmi , K.S. Dhathathreyan , N. Venkateshwaran, Renewable Energy 49, (2013) 161- 165
42. Wrinkled Graphenes: A Study on the Effects of Synthesis Parameters on Exfoliation – reduction of Graphite Oxide, AdarshKaniyoor, TessaTheres Baby, ThevasahayamArockiadoss, NatarajanRajalakshmi, and Sundara Ramaprabhu, The Journal of Physical Chemistry C | 3b2 | ver.9 | 15/8/011
43. Functionalised 2D Graphene Sheets as Catalyst Support for Proton Exchange Membrane Fuel Cell Electrodes, P. Karthika, N. Rajalakshmi, R. Imran Jaffri, S. Ramaprabhu, and K. S. Dhathathreyan, Adv. Sci. Lett, 4, 2012, 1-6.
44. Synthesis of graphene-multiwalled carbon nanotubes hybrid nanostructure by strengthened electrostatic interaction and its lithium ion battery application , J Mater.chem. 2012, In press, B P. Vinayan, Rupali Nagar, V. Raman, N. Rajalakshmi, K. S. Dhathathreyan and S. Ramaprabhu
45. Electrochemical impedance diagnosis of micro porous layer in polymer electrolyte membrane fuel cell electrodes, Int J ournal of Hydrogen Energy 36, 2011, 12352, M. Maidhily, N. Rajalakshmi, K.S. Dhathathreyan
46. Graphene-multi walledcarbon nanotube hybridelectrocatalystsupportmaterialfordirectmethanolfuelcell , NeetuJha, R. Imran Jafri , N. Rajalakshmi , S. Ramaprabhu, Internnnational journal of hydrogen energy , 36(2011)27284
47. Electricity generation by *Enterobacter cloacae* SU-1 in mediator less microbial fuel cell , International Journal of Hydrogen Energy, Volume 35, Issue 15, August 2010, Pages 7723-7729, Antony V. Samrot, P. Senthilkumar, K. Pavankumar, G.C. Akilandeswari, N.Rajalakshmi, K.S. Dhathathreyan

48. Nitrogen doped graphene nanosheets as catalyst support for oxygen reduction reaction in proton exchange membrane fuel cell, R. Imran Jafri, N. Rajalakshmi and S. Ramaprabhu, J. Mater. Chem., 2010, xx, 1–5
49. Solar exfoliated graphene–carbon nanotube hybrid nano composites as efficient catalyst supports for proton exchange membrane fuel cells, S. S. Jyothirmayee Aravind, R. Imran Jafri, N. Rajalakshmi and S. Ramaprabhu, J. Mater. Chem., 2011, 21, 18199
50. Au–MnO<sub>2</sub>/MWNT and Au–ZnO/MWNT as oxygen reduction reaction electrocatalyst for polymer electrolyte membrane fuel cell Original Research Article International Journal of Hydrogen Energy, Volume 34, Issue 15, August 2009, Pages 6371-6376, Razack Imran Jafri, N. Sujatha, N. Rajalakshmi, S. Ramaprabhu
51. Response to the comments by Rezaei et al., on: “Electricity generation by Enterobacter cloacae SU-1 in mediator less microbial fuel cell” by Samrot et al. International Journal of Hydrogen Energy, Volume 35, Issue 19, October 2010, Pages 10636-10637, N. Rajalakshmi
52. Nitrogen-doped multi-walled carbon nanocoils as catalyst support for oxygen reduction reaction in proton exchange membrane fuel cell, Journal of Power Sources, Volume 195, Issue 24, 15 December 2010, Pages 8080-8083, R. Imran Jafri, N. Rajalakshmi, S. Ramaprabhu
53. Nanostructured Pt dispersed Graphene-Multi walled Carbon Nanotube hybrid nanomaterials as electrocatalyst for Proton Exchange Membrane Fuel cells, The Journal of Electrochemical Society (2010) R. Imran Jafri, T. Arockiadoss, N. Rajalakshmi and S. Ramaprabhu,
54. Performance of PEMFC using Pt/MWNT-Pt/C composites as electrocatalysts for oxygen reduction reaction in PEMFC, J. Fuel Cell Science and Technology, 7(2010) 1-7, A. Leela Mohana Reddy, M. M. Shaijumon, N. Rajalakshmi and S. Ramaprabhu
55. Au–MnO<sub>2</sub>/MWNT and Au–ZnO/MWNT as oxygen reduction reaction electrocatalyst for polymer electrolyte membrane fuel cell, International Journal of Hydrogen Energy (2009) 34, 6371-6376, R. Imran Jafri, N. Sujatha, N. Rajalakshmi and S. Ramaprabhu
56. Vibration tests on a PEM fuel cell stack usable in transportation application, International Journal of Hydrogen Energy, (2009) N. Rajalakshmi, S. Pandian, K.S. Dhathathreyan
57. Nano titanium oxide catalyst support for proton exchange membrane fuel Cells, International Journal of Hydrogen Energy, Volume 33, Issue 24, 2008, Pages 7521-7526 N. Rajalakshmi, N. Lakshmi, K.S. Dhathathreyan
58. Assessment of factors responsible for polymer electrolyte membrane fuel cell electrode performance by statistical analysis, Journal of Power Sources 2008 G. Velayutham, K.S. Dhathathreyan, N. Rajalakshmi, D. Sampangi Raman,
59. Statistical Analysis of a PEMFC stack – 2.5 kW system operating condition, J. fuel cell science and Technology (2008) N. Rajalakshmi, G. Velayutham and K.S. Dhathathreyan
60. Pulsed electrodeposition of catalyst layer of PEMFC electrodes, Int. Journal of Hydrogen Energy 33, (2008) 5672-5677 N. Rajalakshmi and K.S. Dhathathreyan
58. Pt-Ru Multiwalled carbon nanotubes as electrocatalysts for direct methanol fuel cells, International Journal of Hydrogen Energy 33 (2008) 427-433 Neetu Jha, A. Leela Mohana Reddy, M.M. Shaijumon, N. Rajalakshmi and S. Ramaprabhu
59. S. Pandian, K. Jayakumar, N. Rajalakshmi and K.S. Dhathathreyan, Thermal and Electrical Energy management in a PEMFC stack – An analytical approach, Journal of Heat and Mass transfer 51 (2008) 469-473
60. N. Rajalakshmi, S. Pandian, K.S. Dhathathreyan, Design and development of modular fuel cell stacks for various applications, Int. Journal of Hydrogen Energy 33 (2008) 449-454
61. ALM Reddy, N. Rajalakshmi, Sundara Ramaprabhu Cobalt-polypyrrole-multiwalled carbon



- nanotube catalysts for hydrogen and alcohol fuel cells, Carbon, Volume 46, Issue 1, January 2008, Pages 2-11
62. M. Krishna Kumar, N. Rajalakshmi, and S. Ramaprabhu, Electrochromism in mischmetal based AB<sub>2</sub> alloy hydride thin film, J PhysChem111, 24, (2007) 8532-37
  63. G Velayutham , J Koushik, N. Rajalakshmi and K S Dhathathreyan Effect of PTFE Content in Gas Diffusion Media and Microlayer on the Performance of PEMFC Tested under Ambient Pressure, Fuel cells Issue No1, (2007) 1-5
  64. K. Jayakumar, S. Pandiyan, N. Rajalakshmi and K.S. Dhathathreyan Cost-benefit analysis of commercial bipolar plates for PEMFC's ,Journal of Power Sources, 161, Issue 1 (2006) 454-459
  65. N. Rajalakshmi and K.S. Dhathathreyan, "Catalyst layer in PEMFC electrodes - Fabrication, characterisation and analysis " Chemical Engineering Journal 129 (2007) 31-40
  66. N Lakshmi, N Rajalakshmi and K S Dhathathreyan, Functionalisation of various carbons for use in Proton Exchange Membrane Fuel Cell electrodes – Analysis and Characterization , J Phys. D Appl. Phys, 39 (2006) 2785–2790
  67. K. Ramya, G. Velayutham, C.K. Subramaniam, N. Rajalakshmi, K.S. Dhathathreyan, Effect of solvents on the characteristics of Nafion®/PTFE composite membranes for fuel cell applications, Journal of Power Sources 160 (2006) 10–17
  68. M.M. Shaijumaon, N. Rajalakshmi, Hojin Ryu and S. Ramaprabhu, Synthesis of multiwalled carbon nanotubes in high yield using Mm based AB<sub>2</sub> alloy hydride catalysts and the effect of purification on their hydrogen absorption properties , Nanotechnology, 16 (2005) 518-524
  69. M. M. Shaijumon, S. Ramaprabhu and N. Rajalakshmi, Multiwalled carbon nanotubes-platinum/carbon composites as electrocatalysts for oxygen reduction reaction in proton exchange membrane fuel cell , Appl. Phys. Lett. 88, (2005) 253105
  70. N. Rajalakshmi, Hojin Ryu, M. M. Shaijumon and S. Ramaprabhu, " Performance of polymer electrolyte membrane fuel cells with carbon nanotubes as oxygen reduction catalyst support material , Journal of Power Sources, 140, (2005) 250-257
  71. N. Rajalakshmi, Hojin Ryu and K.S. Dhathathreyan, Platinum catalysed membranes for proton exchange membrane fuel cells- higher performance, Chemical Engineering Journal 102 (2004) 241
  72. Ganesh Mohan, B. Prabakara Rao, Sarit K. Das, S. Pandian, N. Rajalakshmi and K.S. Dhathathreyan, Analysis of flow maldistribution of fuel and oxidant in a PEMFC, Journal of Energy Resources Technology, Transactions of ASME, 126 (2004) 262
  73. K. Ramya, N. Rajalakshmi, P. Sridhar and B. Sivasankar, Electrochemical characteristics of titanium based hydrogen storage Alloys, J alloys and compounds 373 (2004) 252
  74. N. Rajalakshmi, Hojin Ryu, M.M. Shaijumaon and S. Ramaprabhu Single wall carbon nanotube - a catalyst support for PEMFC, Korean Journal of electrochemical society (2004)
  75. N. Rajalakshmi, T.T. Jayanth, R. Thangamuthu, G. Sasikumar, P. Sridhar and K.S. Dhathathreyan Water Transport Characteristics of Polymer Electrolyte Membrane Fuel cell, Int Journal of Hydrogen Energy, 29 (2004) 1009-1014
  76. N. Rajalakshmi, T.T. Jayanth and K.S. Dhathathreyan Effect of Carbon dioxide and Ammonia on the Polymer Electrolyte Membrane fuel cell stack performance, Fuel cells , 3, No. 4 (2003) 177
  77. G. Gautam, A. Govinda Raj, N. Rajalakshmi, K.S. Dhathathreyan, and C N R Rao, Hydrogen absorption studies in carbon Nanomaterials by gas phase and by electrochemical methods, J. Material science RSC , 13, (2003) 209

78. R.Muruganandham, N. Rajalakshmi, K.S.Dhathathreyan, Investigations of  $\text{MmFe}_2$  electrode for Ni-MH battery, *J Power sources* 114 (2003) 352-356
79. K.Ramya, N. Rajalakshmi and P.Sridhar, Electrochemical studies on the effect of nickel substitution in  $\text{TiMn}_2$  alloys, *J. Alloys and compounds* 352(2002) 315-324.
80. N. Rajalakshmi, M.Raja and K.S Dhathathreyan, Evaluation of current distribution in PEMFC by segmented cell Approach, *JPower sources*, 112 (2002) 331-336
81. K.Ramya, N. Rajalakshmi and P.Sridhar Effect of surface treatment on the electrochemical properties of  $\text{TiMn}_{1.6}\text{Ni}_{0.4}$  alloy in alkaline electrolyte, *J Power sources*, 111 (2002) 335-344.
82. N. Rajalakshmi, P.Sridhar and K.S.Dhathathreyan Identification and characterization of parameters for external humidification used in polymer electrolyte membrane fuelcells, *Journal of Power sources*, 109 (2002) 452 -457
83. P.Sridhar, RamkumarPerumal, N. Rajalakshmi, M.Raja and K.S. Dhathathreyan,, Humidification studies in polymer electrolyte membrane Fuelcells, *J Power sources*, 101 (2001) 72 -78
84. N. Rajalakshmi, K.S.Dhathathreyan and S.Ramaprabhu Electrochemical investigations of  $\text{ZrCr}_m\text{Fe}_n\text{Co}_p\text{V}_o$  ( $m+n+o+p=2$ ) electrode for Ni-MH battery applications, *Int J Hydrogen Energy*, 26 (2001) 1097-1102
85. C. K.Subramanyam, N. Rajalakshmi, K.Ramya and K. S.Dhathathreyan, Modified approach for the fabrication of gas diffusion electrodes for PEMFC, *Bull Electrochem society*, 16 (2000) 350-353
86. N. Rajalakshmi, K. S. Dhathathreyan, B.C.Sathish Kumar, and A.Govinda Raj, Electrochemical investigation of singlewalled carbon nanotubes for Hydrogen, *E ChemActa*, 45 (2000) 4511-15
87. K.S.Dhathathreyan, P.Sridhar, G.Sashikumar, K. K.Ghosh, G.Velayutham, N. Rajalakshmi, C.K.Subramanyam, M.Raja and K.Ramya, Development of Polymer Electrolyte membrane fuelcell Stack, *Int J Hydrogen Energy*, 24 (1999) 1107
88. N. Rajalakshmi and K.S.Dhathathreyan, Evaluation of thermodynamic parameters for the hydrogen in the hydrogen storage device  $\text{ST-90}^{\text{®}}$  *Int J Hydrogen Energy*, 24 (1999) 1067 – 1075
89. N. Rajalakshmi and K.S.Dhathathreyan, Hydrogen solubility properties of  $\text{Ti}_{0.42}\text{Zr}_{0.08}\text{Fe}_{0.50}$ , *Int J Hydrogen Energy*, 24 (1999) 625
90. N. Rajalakshmi and K.S. Dhathathreyan, The hydrogen solubility and thermodynamics of hydrogen dissolved in  $\text{Ti}_{0.45}\text{Fe}_{0.45}\text{B}_{0.10}$  alloy, *Int.J. Hydrogen Energy*, 23 (1998) 879
91. S. Ramaprabhu, N. Rajalakshmi and Al. Weiss, Design and development of high pressure apparatus for hydrogen, absorption and desorption studies, *Int. J. Hydrogen Energy*, 23 (1998) 797
92. G.Bernardinelli, T.Berclaz, M.Geoffroy and N. Rajalakshmi, X ray crystal structure analysis of Carnidazol *Acta Crystallography*, sect.C, (1995)
93. T.Berclaz, G.Bernardinelli, M.Geoffroy and N. Rajalakshmi, Radiation damage in Carnidazole: a single crystal EPR study, *Chimia*, 46 (1992) 130
94. M.Geoffroy, T.Berclaz, A.C.Berthier, N. Rajalakshmi and M.V.V.S. Reddy, Radical pair formation in a single crystal of bromonitrothiozole after X-irradiation at 77 K: An ESR study. *Radiation Phys.Chem*, 38 (1991) 519
91. S.Ramaprabhu, N. Rajalakshmi and Al.Weiss, Solubility of hydrogen in  $\text{Ti}_3\text{In}$ , *Journal of Less Common Metals*, 157 (1990) 85
92. S.Ramaprabhu, N. Rajalakshmi, Al.Weiss, Thermodynamics of hydrogen dissolved in  $\text{Pd}_{1-x}\text{Th}_x$  and  $\text{Pd}_{1-x}\text{Zr}_x$  ( $x = 0.05$  and  $0.08$ ) solid solution alloys, *BerBunsengesPhysikalischeChemie*, 94 (1990) 490

93. S.Ramaprabhu, N. Rajalakshmi and Al.Weiss A comparative study of the solubility and thermodynamics of hydrogen in  $\text{Pd}_{1-x}\text{RE}_x$  (RE = Gd, Dy, Sm and Y;  $x = 0.05$  and  $0.08$ ) alloys, *BerBunsengesPhysikalischeChemie*, 93 (1989) 686
94. N. Rajalakshmi, K.V.S.RamaRao and Al.Weiss,  $^1\text{H}$  NMR studies of the system  $\text{Ti}_3\text{SbH}_x$  *BerBunsengesPhysikalischeChemie*, 93 (1989) 157.
95. N. Rajalakshmi, U.V.VaradaRaju and K.V.S.RamaRao, Solubility of hydrogen in  $\text{Ti}_3\text{Cu}$ , *Journal of Less Common Metals*, 128 (1987) 57

#### **Review Article**

96. The solubility and thermodynamics of hydrogen in Palladium, substitutional binary  $\text{Pd}_{1-x}\text{Z}_x$  and ternary  $\text{Pd}_{1-x-y}\text{Z}_x\text{Z}'_y$  solid solution alloys. Al. Weiss, S.Ramaprabhu, and N.Rajalakshmi (REVIEW ARTICLE) *Z. Physikalische Chemie, Neue Folge*, 199, 165 (1997).

#### **Chapters in Books**

97. N. Rajalakshmi, K.S.Dhathathreyan and SundaraRamaprabhu  
Investigation of a novel metal hydride electrode for Ni-MH batteries  
*Advances in Hydrogen energy*, Kluwer Academic/ Plenum Publishers, 2000
98. N. Rajalakshmi and K.S.Dhathathreyan, "Hydrogen Energy Technologies", in *The New Energy Economy*, published by World Institute of sustainable energy (2005)
99. K.S.Dhathathreyan and N.Rajalakshmi "Polymer Electrolyte Membrane in Fuel cell " in *Recent trends in Fuel cell Science and Technology*, Eds. S.Basu, Anamaya Publishers, New Delhi, Dec. 2006 (published by Springer out side India)
100. N.Rajalakshmi and K.S.Dhathathreyan, "Present Trends in Fuel Cell Technology Development", in "Progress in Fuel Cell Research " ed. Petr. V. Alemo, NOVA Publishers, USA (2007)
101. N.Rajalakshmi and K.S.Dhathathreyan, Present Trends in Fuel Cell Technology Development, NOVA Publishers, USA (2008)
102. K.S. Dhathathreyan, N.Rajalakshmi, Challenges in PEM Fuel cell development, *Indian Association of Nuclear Chemists and allied Scientists Bulletin*, 2009, 3, P. 214,
103. K.S.Dhathathreyan, N.Rajalakshmi and R.Balaji, *Nanomaterials for PEM Fuel cells*, Wiley publishers, 2017
104. N.Rajalakshmi, R.Imran Jafri and K.S.Dhathathreyan, *Recent advances in low temperature fuel cells*, Wiley 2017
105. N.Rajalakshmi, R.Imran Jaffri, T.Ramesh, *Porous carbon materials for fuel cell application*, Wiley 2017

#### **Conferences**

106. Aluminum Hydride synthesis by Electrochemical route, A.Abinaya, T.Ramesh, R.Balaji, N.Rajalakshmi V.Venkatesan and Arvind Kumar Presented at the 11<sup>th</sup> High energy Material conference & Exhibits, 23<sup>rd</sup> to 25<sup>th</sup> Nov 2017, Pune, India
107. Durable Zirconium Carbide Supports For Oxygen Reduction Reaction In Polymer Electrolyte Membrane (Pem) Fuel Cells, Prithi. J. A. N. Rajalakshmi, G. Ranga Rao, Fuel Cell and Hydrogen Technical Conference 2017, 1<sup>st</sup> June 2017, Birmingham University, UK
108. Facile synthesis of carbon microspheres/ $\text{MnO}_2$  composite as high-performance electrodes for supercapacitors T. Ramesh N. Rajalakshmi, L. Ram Gopal Reddy, National Conference On Recent Developments In Chemical Sciences And Allied Technologies (RDCST-2017), 29<sup>th</sup> to 30 June 2017
109. Hierarchically porous carbon derived from agricultural resource for high power supercapacitor application, T. Ramesh, N. Rajalakshmi, K. S. Dhathathreyan, L. Ram Gopal Reddy, International conference on nanomaterials and nanotechnology, 1-3 March 2017, Allahabad, India

110. Synthesis of Trimetallic Pt-M alloy Catalyst for Oxygen Reduction Reaction for PEMFCs Application , A.Balamurugan and N.Rajalakshmi, International conference on nanomaterials and nanotechnology, 1-3 March 2017, Allahabad, India
111. Nafion Based Composite Electrolytes for PEMFC- Hydrocarbon based Membrane Prithi. J . A, Catherine Swetha. A, N. Rajalakshmi International Conference on Membrane Technology and its Applications (MemSep 2017) 21<sup>st</sup> - 23<sup>rd</sup> Feb 2017, NIT Trichy, India
112. Operational Experiences of PEMFC Stack with Combined Heat and Water - Humidity Perspective, S.Meenakshi and N.Rajalakshmi, International Conference on Membrane Technology and its Applications (MemSep 2017) 21<sup>st</sup> - 23<sup>rd</sup> Feb 2017 , NIT Trichy, India
113. Graphene based Pt electrocatalyst for SO<sub>2</sub> tolerance in PEMFC, N.Rajalakshmi, J.A.Preeti, R.Imran Jaffri and K.S.Dhathathreyan, Hypothesis 2013
113. Pt-Graphene catalyst for enhanced electrochemical performance towards methanol oxidation in fuel cell, P.Karthika, N.Rajalakshmi and K.S.Dhathathreyan , and D.Arivouli, Hypothesis 2013
114. PEMFC for transport application at CFCT, B.Sasank, N.Rajalakshmi and K.S.Dhathathreyan, Hypothesis 2013
115. DCM and PCM based thermal management for fuel cells B.Sasank, N.Rajalakshmi and K.S.Dhathathreyan, Hypotehsis 2013
116. Polyelectrolyte functionalized graphene multi walled carbon nanotube hybrid nanomaterial as anode for Li- ion battery, Intentaional conference on Nanomaterials, Cochin, India, 2012
- 117.** Design and Development of a Closed Two Loop Thermal Management Configuration for PEM Fuel Cell, B Viswanath Sasank, N.Rajalakshmi, K.S.Dhathathreyan Proceedings of 2012 International Conference on Chemical and Process Engineering ,(CCPE 2012) ISBN 978-1-84626, Hong Kong, 2-3 June, 2012
118. TiO<sub>2</sub> nanotube (NT-TiO<sub>2</sub>) array based durable electro catalyst support for PEMFC, .Maidhily, N.Rajalakshmi , K.S.Dhathathreyan and D.Arivuoli, Advanced nanomaterials conference, IITM Chennai, Oct 2012,
119. Nanocarbons for hydrogen storage Advanced nanomaterials conference, IITM Chennai, Oct 2012
120. Role of Cobalt in carbon supported Pt-Co catalyst for Oxygen Reduction activity in PEMFC, N.Rajalakshmi, P.Karthika, M.Maidhily and K.S.Dhathathreyan Presented at the GRC conference at Rhodelsland , Smithfield ,USA during 2010
121. N.Lakshmi, N.Rajalakshmi, T.N.Rao and K.S.Dhathathreyan, Non platinum anode electrocatalyst for PEMFC, Presented at the **GRC conference** at Rhodelsland , Smithfield ,USA during 2009
122. **N.Rajalakshmi** and K.S.Dhathathreyan Electrochemical reactivity mapping of the catalyst layer of the PEMFC electrode by Scanning Electro Chemical croscope (SECM), Presented at the **GRC conference** at Rhodelsland , Smithfield ,USA during Mjuly 22<sup>nd</sup> to 27<sup>th</sup> 2008, 2007
123. Characterization and Optimization of Low Cost Activated Carbon Fabric as a Substrate Layer for PEMFC Electrodes. FUELCELL2005-**74182**, Natarajan Rajalakshmi, Centre for Fuel cell Technology, Velayutham G, centre for Fuel cell , Presented at the 3<sup>rd</sup> In conf on Fuel cell science engineering and technology, Ypsilanti, Michigan May 23-25, 2005
124. N.Rajalakshmi and K.S.Dhathathreyan Design & Development of Modular Fuel cell stacks for various applications at the “ International Workshop on “Hydrogen Energy , production, storage and application (IWHE 2006)

125. N.Rajalakshmi, Nanomaterials in Fuel cells” in the session of “Energy and New materials” in International symposium on Nanoscience, Technology and Education being held at Cochin during Aug 16<sup>th</sup> to 18<sup>th</sup> 2006
126. N.Rajalakshmi, G.Velayutham, K.Ramya, C.K. Suibramaniam and K.S. Dhathathreyan, Characterisation and optimization of a low cost activated carbon fabric as a substrate layer for PEMFC electrodes, Proceedings of the third ASME International conference of Fuel cell Science, Engineering and Technology, May 2005, Ypsilanti, USA
127. PEM FUEL CELL STACK DEVELOPMENT – GRAFOIL BIPOLAR MATERIALS- A FEASIBILITY STUDY, N.Rajalakshmi, V.Vijay, S.Pandian and K.S.Dhathathreyan, Proceedings of the Second ASME International conference of Fuel cell Science, Engineering and Technology, Rochester, New York, 2004
128. N.Rajalakshmi, R.Rajni and K.S.Dhathathreyan, Proceedings of the Second ASME International conference of Fuel cell Science, Engineering and Technology, Rochester, New York, 2004
129. N. Rajalakshmi, K. S. Dhathathreyan and S.Ramaprabhu, Electrochemical Investigation of  $Y_xZr_{1-x}Mn_mFe_nCo_pV_oCr_q$  electrodes for Ni-MH battery applications, Oral presentation at the ACS Meeting at New Orleans, Louisiana, USA, held during Aug 22-26<sup>th</sup> (1999).
130. S.Parthasarathy, V.K. Venkatesan, K.S.Dhathathreyan, P.Sridhar, G.Sashikumar, K. K.Ghosh, G. Velayutham, N. Rajalakshmi, C.K. Subramanyam, M.Raja and K.Ramya, Polymer Electrolyte Membrane Fuel cell Paper presented at the International conference 3<sup>rd</sup> Indo-German seminar on Electrochemistry (1996) Bangalore, INDIA
131. T.Berclaz, N. Rajalakshmi, M.Geoffroy and E.Soulie, Irradiation aux rayons-X de derives monocristallins de la Nitroimidazole a 77K: Etude par RPE de radicaux piéges en paires et application de l'algorithme Levenberg Marquardt a l'optimisation des tenseurs RPE, Presented at the international conference on EPR, Paris, France, september (1994).
132. T.Berclaz, M.Geoffroy and N. Rajalakshmi, Single crystal ESR studies on metronidazole., Presented at the XII International symposium on Biophysics and Biomolecules, Vancouver, Canada, July (1990).

### **Annexure -3- students**

1. Ph.D Physics Anna University 2011, P.Karthika completed
2. Ph.D Interdisciplinary, Ms.Prithi, IITM, 2014 –Ongoing
3. Ph.D Chem Engg, Ms.Anusree, IITH, 2014, Ongoing
4. Ph.D Physics, Mr.Ramesh, NIT Warangal, Ongoing
5. Ph.D Metallurgy, Mr.Ramakrishna, IIT Kanpur 2018- Ongoing
6. Ph.D, Metallurgy, Ms.Harini, IIT Madras, 2018 - On going
7. M.Tech Mr.Ragul Krishna, Pondicherry Univ, 2015
8. M.Sc, Physics, Mr.Guru prasanna, 2016
9. B.Tech, Chem Engg, Mr.Pranav Ramesh, 2015
10. B.Tech, chem., Mr.Ashwin Nambi, 2016
11. M.Sc, Physics, Ms.S.Abinaya, Madras University, 2016
12. M.Sc, Physics, Ms.Swetha Catherine, Madras University, 2016
13. B.Tech, IIT Gauhati, summer intern project 2013, Mr.Arvindsekar
14. B.Tech SRM University, Summer intern project 2013, Mr.Misra
15. B.Tech, IIT Madras Summer intern 2012, Mr. Vimal
16. BITS pilani, Final year project, Sarat Chandran . Gautam, 2011
17. SSN college, Chennai B.Tech(2011) 2 students
18. Sai Ram college, Chennai, B.Tech, (2011) 2 students
19. M.Sc, Biotechnology, Satyabhama University, Microbial Fuel cells, 2010 G.C. Akilandeswari

20. M.Sc Biotechnology, Satyabhama University, Cellulose based microbial fuel cells, 2010, K.Pavan Kumar
21. M.Sc, Biotechnolgy, Satyabhama University, 2010, R.Sowmya
22. M.Tech , Biotechnolgy, satyabhama University, H2 production from Algae, 2009
23. M.Tech, Biotechnology, Satyabhama University, Electricity Production from waste water using microbial fuel cells, 2009
24. M.Phil, Madras University, catalyst layer by electrophoretic deposition in PEMFC, Asha MaryThomas, 2007, Co guide
25. B.E Chemical Engg., BITS, Pilani, Water management in PEM Fuel cells, S. Bhooma, June 1999, Co-guide
26. B.E Chemical Engg, BITS, Pilani, Water Management in PEM Fuel cells, MeenaKaul, June 1999, Co-guide
27. B.E Chemical Engg, BITS, Pilani, Investigation of external humidification parameters, C. Subhashini, June 2001, Guide
28. B.E Chemical Engg, BITS, Pilani, Investigation of water uptake by various membranes in a PEMFC humidification system S. Sowmya Dec 2001, Guide
16. B.E Chemical Engg, BITS, Pilani, Evaluation of Current distribution in PEM Fuel cell, R. Anuradha, Dec 2001, Co guide
29. B.E Chemical Engg, BITS, Pilani, Studies on the effect of impurities on fuel cells, K.Anjana, June 2002, Guide
30. B.E Chemical Engg, BITS, Pilani, Integration of hydride storage unit with fuelcell system , SwarnaMukhi June 2002, Guide
31. M.E Mechanical Engg, BITS Pilani, Rationalisation of stack assembly of PEM Fuel cells , Mr.ManishMukundKurhekar, June 2002, Co Guide
32. B.E Chemical Engg, BITS Pilani Evaluation of reformate electrodes for Fuelcell R.Nachammai, Guide
33. B.E Instrumentation Engg, BITS Pilani VFD for Blower, 2002, C.Vijay, Co guide