

CURRICULUM VITAE

R.BALAJI

Sr.Scientist

Centre for Fuel Cell Technology (CFCT)
International Advanced Research Centre
for Powder Metallurgy and New Materials (ARCI)
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EDUCATION QUALIFICATION

April '2002-July' 2006

PhD
CSIR-CECRI, Karaikudi, India

Nov'1998- Nov'2000

Post Graduate in Chemistry
Dept of Chemistry, Alagappa University
Karaikudi, Tamilnadu

June'1994 – May'1997

Under Graduate in Chemistry
Madurai Kamaraj University, Madurai,
Tamilnadu

PROFESSIONAL EXPERIENCE

Dec'2010 - Till Date

Senior Scientist
Centre for Fuel Cell Technology
ARCI, Chennai.

Sep'2009-Nov' 2010

Post Doctoral Fellow
Kitami Institute of Technology, Japan &
ARCI, Chennai

Aug'2008-August' 2009

Research Associate
CSIR-CECRI, Karaikudi

Aug'2006-Sep' 2008

Scientist,
Centre for Energy Research
SPIC Science Foundation, Chennai

Aug'1998- July' 2006

Project Associate,
CSIR-CECRI, Karaikudi, India

FIELD OF RESEARCH INTEREST

Hydrogen energy technologies Electrochemistry, Electrochemical process, Electrocatalysts, Electroplating, corrosion, water/waste water treatment

PROJECTS HANDLING/HANDLED

| S.No | Title | Sponsoring Agency/Role | Period |
|------|--|--|---|
| 1 | Smart hydrogen supply chain supported PEM fuel cell in Telecom Tower power backup | Dept.of Science &Technology Co- Principal Investigator | Mar'22-Mar'25 On-going |
| 2 | Design and development of 20kW Low Temperature Polymer Electrolyte Membrane (LT-PEM) fuel cell with high indigenous content | MNRE, Principal Investigator | Four years 2019-2023 On-going |
| 3 | Development and Demonstration of PEM based Electrochemical Methanol Reformer for Hydrogen Production | Dept.of Science &Technology / Principal Investigator | Three years (2016-2019) completed |
| 4 | Development and Manufacturing of metallic Flow field Plates by hydro forming method for PEM Fuel cells | Dept.of Science &Technology Co- Principal Investigator | Four years (2016-2020) completed |
| 5 | Design and development of rechargeable Zinc-Nickel and Zinc Air Battery for energy storage application. | DST, TRC Project As Team member | Five years 2015-2021 completed |
| 6 | Electrochemical Synthesis of α -Aluminium Hydride an advanced Propellant Ingredient | DRDO Co- Principal Investigator | Three years (2016-2019) Completed. |
| 7 | Development & Demonstration of PEM based Electrochemical Methanol Reformer for H ₂ Production (1.0 Nm ³ /hr) | In house project Principal Investigator | 2011-14 Completed |

ACCOMPLISHMENT AS A TEAM MEMBER/LEADER IN PROCESS KNOW-HOW DEVELOPMENT

- Technology development for “Electrochemical Hydrogen Compressor”. Know-how transferred to M/s.Eastern Electrolyser Ltd. New Delhi in Aug'2009.
- Technology development for “Activated Nickel Electrodes for Alkaline Water Electrolyzer”. Know-how transferred to M/s.Eastern Electrolyser Ltd. New Delhi, in April' 2009.
- Developed and demonstrated 200 W Hydrogen/Air Polymer Electrolyte Membrane (PEM) fuel cell systems and supplied to Military College of Electronics and Mechanical Engineering College, Secunderabad in May' 2007.
- Electrolytes developed for “White and Yellow Bronze Coatings” for decorative applications.

Technology transferred to M/s.K.M. Gadia & Sons, Bangalore in July'2006.

- Process developed for “Electro-deposition of Nickel-Diamond Composite Coatings”. Know-how transferred to (i) M/s. L.M. Van Moppes Diamond Tools India Pvt. Ltd. Chennai in Sep'2002. (ii) M/s. Control System & Service Engineers. Jaipur in June'2005

PATENTS

1. “A Polymer Electrolyte Membrane (PEM) cell and a method of producing hydrogen from aqueous organic solutions in pulse current mode”
K.S.Dhathathreyan, **R.Balaji**, K.Ramya, N.Rajalakshmi.
Indian Patent no.338862 /2020
2. “Exfoliated Graphite separator based Electrolyzer for Hydrogen generation”.
K.S.Dhathathreyan, **R.Balaji**, K.Ramya, N.Rajalakshmi, L.Babu, R.Vasu, P.Sarangan,
R.Parthasarathy Indian Patent No. 369206/2021.
3. A Grid Independent Fuel Cell system with a unitized (Dc&AC) power conditioner
N.Rajalakshmi, K.Ramya, **R.Balaji**, S.Bharathi, K.Sanjeev, K.Ranjan,M.M.Ramakrishna
Indian Patent Application No: 201911006700
4. Method of preparing gas diffusion layer for the electrode of ECMR cell for hydrogen generation
R.Balaji, N.Rajalakshmi, K.Ramya, R.Vasudevan, K.Sudalayandi
Indian Patent Application No: 201911030852
5. Method of manufacturing the catalyst coated membrane for the proton exchange
membrane fuel cells
N. Rajalakshmi, **R.Balaji**, E.Ganesan, D.Uday kiran, R.Vasudevan
Indian Patent Application No. 202011046496

INTERNATIONAL PUBLICATIONS

1. Hydrogen Production by Electrochemical Methanol Reformation using Alkaline Anion Exchange Membrane based cell.
Manjula Narreddula, R. Balaji, K. Ramya, N. Rajalakshmi
Int.J.Hydrogen Energy, Vol.45, P 10304-10312, 2020
2. Promising nature-based nitrogen-doped porous carbon nanomaterial derived from borassus flabellifer male inflorescence as superior metal-free electrocatalyst for oxygen reduction reaction.
Thileep kumar.k, Sivagaami Sundari.G, Senthil kumar.E, Shanmugaraj.A, Kalaivani.R, Balaji.R, Raghhu.S
Int.J.Hydrogen Energy, Vol.44(47) 2019,25918-25929.
3. “Nitrogen doped graphene supported Pd as hydrogen evolution catalyst for electrochemical methanol reformation”
Manjula Narreddula, R. Balaji, K. Ramya, N. Rajalakshmi, A. Ramachandraiah
Int. Journal of Hydrogen Energy, Vol.44, P4582-4591,2019.
4. Electrochemical methanol reformation (ECMR) using low cost sulfonated PVDF/ZrP membrane for Hydrogen Production
N.Manjula, **R.Balaji**, K.Ramya, N.Rajalakshmi K.S.Dhathathreyan, A. Ramachandraiah
Journal of Solid State Electrochemistry, Vol.22, P 2757-2765, 2018.

5. Influence of ethyl acetate as a contaminant in methanol on performance of Electrochemical Methanol reforming (ECMR) for hydrogen production
N.Manjula, **R.Balaji**, K.Ramya, N.Rajalakshmi K.S.Dhathathereyan, A. Ramachandraiah
Int. J. Hydrogen Energy, 43(2) **2018**, 562-568.
6. An improved method of water electrolysis – effect of complexing agent.
S.Seetharaman, **R.Balaji**, K.Ramya, K.S.Dhathathereyan, M.Velan
Journal of Electrochemical Science and Engineering, 6(3), **2016**, 215-223.
7. Studies on development of Titanium oxide Nano Tube (TNT) based ePTFE–Nafion–composite membrane for electrochemical methanol reformation
N.Manjula, **R.Balaji**, K.Ramya, K.S.Dhathathereyan, A. Ramachandraiah
Int. J. Hydrogen Energy, 41 **2016**, 8777- 8784.
8. Palladium Nanoparticles as Hydrogen Evolution Reaction (HER) electrocatalyst in Electrochemical Methanol Reformer
K. Naga Mahesh, **R. Balaji**, K.S. Dhathathreyan
Int.J. Hydrogen Energy 41 ,**2016**, 46-51
9. Studies Noble metal free carbon based cathodes for Magnesium–Hydrogen peroxide fuel Cells.
K. Naga Mahesh, **R. Balaji**, K.S. Dhathathreyan
Ionics, 21(9), **2015** 2603-2607.
10. Electrochemical behaviour of nickel based electrodes for oxygen evolution reaction in alkaline water electrolysis
S.Seetharaman, **R.Balaji**, K.Ramya, K.S.Dhathathereyan, M.Velan
Ionics, Springer 20(5), **2014**, 713-720.
11. Graphene oxide modified non noble metal electrode for alkaline anion exchange membrane water electrolyzer”
S.Seetharaman, **R.Balaji**, K.Ramya, K.S.Dhathathereyan, M.Velan.
Int. J. Hydrogen Energy, 38, **2013**, 14934-14942.
12. Studies on polymer modified metal oxide anode for oxygen evolution reaction in saline water
R Venkatkarthick; S Elamathi; D Sangeetha; **Balaji Rengarajan**; B Suresh Kannan; S Vasudevan; D Jonas Davidson; G Sozhan; Subbiah Ravichandran
Journal of Electroanalytical Chemistry, 697, **2013**, 1-4.
13. Operation method study based on the energy balance of an independent microgrid using solar-powered water electrolyzer and an electric heat pump “
Shin'ya Obara, Seizi Watanabe, **Balaji Rengarajan**
Energy, 36(8), **2011**, 5200-5213.
14. “Operation planning of an independent microgrid for cold regions by the distribution of fuel cells and water electrolyzers using a genetic algorithm”
Shin'ya Obara, Seizi Watanabe, **Balaji Rengarajan**
Int. J Hydrogen Energy, 36(22), **2011**, 14295-14308
15. Operational Planning of an engine generator using a high pressure working fluid composed of CO₂ hydrate
Shin'ya Obara, Takanobu Yamada, Kazuhiro Matsumura, Shiro Takahashi, Masahito Kawai,
Balaji Rengarajan
Applied Energy, 88(12) **2011**, 4733-4741

16. Sulfonated polystyrene-block-(ethylene-ran-butylene)-block-polystyrene (SPSEBS) membrane for sea water electrolysis to generate hydrogen.
S. Ravichanran , **R. Balaji**, B. Suresh Kannan, S. Elamathi, D. Sangeetha, J. Lakshmi, S. Vasudevan and G. Sozhan
ECS Transactions, 33 (27) **2011**, 157-166

17. Unconventional Hydrogen Compression in an electrochemical method.
S. Navaneethakrishnan, G. Sozhan, S. Vasudevan, S. Ravichandran, **Rengarajan Balaji**,
Jordan Journal of Mechanical and Industrial Engineering. **2011**

18. Development and Performance evaluation of polymer electrolyte membrane (PEM) based hydrogen generator for portable applications
R. Balaji, N. Senthil, S. Vasudevan, S. Ravichandran, G. Sozhan.
Int. J. Hydrogen Energy, 36 **2011**, 1399-1403.

19. An alternative approach to selective sea water oxidation for hydrogen production
R. Balaji, B. Suresh Kannan, J. Lakshmi, S. Vasudevan, G. Sozhan, A. K. Shukla, S. Ravichandran.
Electrochemistry Communication 11(8) **2009**, 1700-1703.

20. Aqueous methanol electrolysis using proton conducting membrane for hydrogen production.
G. Sasikumar A. Muthumeena, S. Sundar Pethaiah, N. Nachiapam and **R. Balaji**.
Int. J. of Hydrogen energy. 33, **2008**, 5905-5910.

21. Electrochemical regeneration of chromium containing solution from metal finishing industry
S. Vasudevan, G. Sozhan, S. Mohan, **R. Balaji**, Malathy Pushpavanam, and S. Pushpavanam
Ind. Eng. Chem. Res. 46, **2007**, 2898-2901.

22. Recovery of chromium from the solid residue by In-Situ- generated hypochlorite.
G. Sozhan, S. Mohan, S. Vasudevan, **R. Balaji** and S. Pushpavanam
Ind. Eng. Chem. Res. 45, **2006**, 7743-7747.

23. Electrodeposition of bronze-PTFE composite coatings and study on their tribological characteristics."
R. Balaji, Malathy Pushpavanam, K. Yogesh Kumar, K. Subramanian
Surface & Coatings Technology 201, **2006**, 3205-3211.

24. *Electrodeposition of Copper-Tin-Ptfe composite coatings.*
Balaji, R. and Pushpavanam, M. and Yogeshkumar, K. and Subramanian
Indian Surface Finishing, 3 (3-4) **2006**, pp. 381-391. ISSN 0972-9364

25. Methane sulfonic acid in electroplating related metal finishing industry.
R. Balaji and Malathy Pushpavanam
Translated and Published by *Electroplating and Finishing in China* 23(5), **2004**, 40-45.

26. Methane Sulfonic Acid in Electroplating Related Metal Finishing Industry
R. Balaji and Malathy Pushpavanam
Transaction of Institute of Metal Finishing 81(5), **2003**, 154-158.

BOOK CHAPTER

1. First and Second Law of Thermodynamics—Analysis for Fuel Cells
S. Yasodhar, R. Balaji, N. Rajalakshmi, Arul Prakash Reference Module in Earth Systems and Environmental Sciences 2021, Elsevier

2. Recent developments in Hydrogen Fuel cell - Strengths and Weakness “,
N.Rajalakshmi, R.Balaji, S..Ramakrishna in the Sustainable Fuel Technologies Handbook ed
Suman Dutta and Chaudhery Mustansar Hussain ISBN : 978-0-12-822989-7 ,pp 431-456,**2021**
3. Nano Materials for Fuel Cell Technology”
K.S.Dhathathreyan, N.Rajalakshmi, **R.Balaji**
Chapter24 in Book of Nanotechnology for Energy Sustainability, PP-659-595
Editor: Marcel Van de Voorde, Baldev Raj, Yashwant Mahajan, Publisher:WILEY-VCH, ISBN: 978-3-527-34014-9 **2016**.

INTERNATIONAL CONFERENCE/ PROCEEDINGS

1. A Three dimensional CFD simulation of PEMFC with the modified-parallel flow field design
Surabattula Yasodhar, N. Rajalakshmi and R. Balaji
Paper presented at National Convention of Electrochemist (NCE 21) held at, Vellore Institute of Technology, Chennai, during Jan 30, 2020.
2. Patterned method of coating on flow field plates of PEM based Electrolyser for Hydrogen production
Sri Harsha Swarna Kumar, R.Balaji, N.Rajalakshmi, Lakshman Neelakantan.
Paper presented at International Conference on Advances in Minerals, Metals, Materials, Manufacturing and Modelling 2019 (ICAM⁵-2019), Warangal, on Sep 25th-27th,2019.
3. Aluminium Hydride as an advanced propellant Ingredient- A synthesis perspective
G.T.Harini, T.Ramesh R. Balaji, N. Rajalakshmi, V. Venkatesan, S.Nandagopal
Paper Presented at Advanced Materials and Processes for defence applications (ADMAT19) on Sep 23-25'2019 at Hyderabad.
4. Hydrogen Fuel Cell Activities at ARCI-CFCT, presented in International conference and workshop on Hydrogen Fuel cell (FCHFC-2019) held at Vancouver, Canada during May 22-23, 2019.
5. Hydrogen Production by Electrochemical Methanol Reformation using Alkaline Anion Exchange Membrane Cell
N.Manjula, R.Balaji, K.Ramya, N.Rajalakshmi
“International Conference on Advanced Energy Materials (AEM-2018)” held at University of Surrey, London during Sep 10-12, 2018
6. A preliminary study on synthesis of sulfonated PVDF-co-HFP membrane and its application in electrochemical methanol reformation”
N.Manjula, R.Balaji, K.Ramya, N.Rajalakshmi
“International Conference on Nano Science and Technology” held at Bangalore during March 21-23, 2018
7. Studies on evaluation of stainless steel as bipolar plates for PEM fuel cell
R.Balaji, Akilesh Nair, N.Rajalakshmi.
International conference on Electrochemical Science &Technology (ICONEST-2017)
IISc, Bangalaore during 10-12 Aug'2017.
8. Methanol-Water electrolysis using TNT based composite membrane for hydrogen gas Generation
N.Manjula, R.Balaji, K.Ramya, K.S.Dhathathreyan, A. Ramachandraiah
Paper presented in National Conference on Advanced Functional Materials (NCAFM-

- 15) at SRM University, Chennai on May 8-9, **2015**
9. Hydrogen Generation via Urea electrolysis using Nickel alloy electrode
L.S.Ranjani, **R. Balaji**, K.Ramya, K.S.Dhathathereyan
Paper Presented in National Symposium on electrochemical Science and Technology (NSEST- 13) at Indian Institute of Science, Bangalore on Aug 23-24, 2013
 10. Carbon Assisted Water Electrolysis for Hydrogen Generation
S.Sabareeswaran, **R. Balaji**, K.Ramya, N.Rajalakshmi, K.S.Dhathathereyan
AIP conference proceedings, 1538, 43-47 (2013)
 11. Synergistic effect of stabilizer in alkaline water electrolysis
S.Seetharaman, **R. Balaji**, K.Ramya, K.S.Dhathathereyan, M.Velan
Paper Presented in Seventeenth National convention of Electrochemists (NCE-17) at B.S.Abdur Rahman University, Chennai on 14-15th Sep' 2012
 12. Sulfonated polystyrene-block-(ethylene-ran-butylene)-block-polystyrene (SPSEBS) membrane for sea water electrolysis to generate hydrogen
S. Ravichanran, **R. Balaji**, B. Suresh Kannan, S.Elamathi, D. Sangeetha, J. Lakshmi, S. Vasudevan, G. Sozhan.
218th ECS Meeting Las Vegas, USA, on October 10-15, **2010**.
 13. Electrochemical compression of hydrogen
G. Sozhan, S. Vasudevan S. Ravichandran **R. Balaji**, S.Navaneethakrishnan, V. Sankari J.Lakshmi
217th ECS Meeting. Canada, on April 25-30, **2010**.
 14. Hydrogen production from renewable energy sources
R. Balaji, Shinya Obara
SAEST News letter, India **2009**, 4(3), 1.
 15. Water oxidation on various carbon electrodes
S.Ravichandran, S.Vasudevan, G.Sozhan, , N.Senthyl, **R. Balaji**. J.Lakshmi
3rd International conference on Electrochemical Power Systems (ICEPS-3)Trivanandapuram, India on Nov 26-28, **2008**.
 16. Comparative performance of copper electro deposition from sulphonate and sulfate bath
R. Balaji and Malathy pushpavanam
Futuristic aspect of Electrochemical Science and Technology held at CECRI, Karaikudi, India on July **2003**.
 17. Recovery of chromium value from the solid residue of chromate plant"
S.Pushpavanam, G.Sozhan, S.Mohan, S.Vasudevan, and **R. Balaji**.
7th International Symposium on Advances in Electrochemical Science and Technology Chennai, India on Nov'27-29 **2002**.
 18. Recovery of chromium from chromate plant solid effluent"
S.Pushpavanam, G.Sozhan, S.Mohan, and **R. Balaji**.
14th International forums on applied electrochemistry' held at Florida, USA, on Nov.12-16, **2000**.

INVITED TALK DELIVERED

1. "The significant role of functional materials in realizing a hydrogen economy" at International Conference on Functional Materials for Energy, Environment and Bio Medical Applications, organized by Bishop Heber College, Tiruchirapalli during May 4th 2022.
2. The journey of Hydrogen Fuel cell R&D activities at ARCI at Hydrogen Fuel Cell; Technology and Market Perspective webinar conducted by smart energy Magazine during 12th March 2022.
3. "Application of Hydrogen fuel cell" at Prof.G.C.Carg Endowment Lecture conducted by Department of Automobile Engineering, MIT, Anna University Chennai during August '26th 2021.
4. An overview on Hydrogen generation by water electrolysis" at Five-Day Online ATAL Faculty Development Program on Fuel Cell Technology [FCT-2021] conducted by National Institute of Technology, Roorkela, Department of Mechanical Engineering during June 24th 2021
5. The role of fuel cell in Hydrogen Energy Technology "at Induction programme on Recent Trends in EV Technologies- Phase II conducted by Easwari Engg. College, Chennai during March, 29, 2021(online).
6. Hydrogen Energy Technology- An overview at "Faculty Development programme on Advances in Chemical Sciences conducted by Dr.N.G.P. Institute of Technology, Coimbatore during March 23,2021.(online)
7. Hydrogen Generation Programme at ARCI-CFCT" at webinar on 'Role of Hydrogen in Energy Regime and preparedness of India' conducted by ONGC during March ,22,2021 (online)
8. Hydrogen Energy Technology for Electric Vehicle "at Induction programme on Recent Trends in EV Technologies-Phase 1 conducted by Easwari Engg. College, Chennai during Feb, 26,2021(online)
9. The role of electrochemistry in surface Engineering at Faculty Development Program on "Advances in Surface Engineering" conducted by Thiyagaraja college of Engg Madurai during Jan'30,2021. (online)
10. An overview on materials development for Hydrogen Energy Technology on Skill based programme-RUSA conducted by Dept of Energy, Madras University, Chennai during 04th Jan 2021.
11. Hydrogen Fuel Cell- An alternative Energy solution for E-Vehicles on online Faculty Development Program on Energy Storage and Conversion with Efficient Nanomaterials conducted by Bharathiyar University during 07th October 2020.
12. PEM fuel cell system- Fundamentals and Applications on Guest lecture at Mechanical Engineering Department Yeshwantrao Chavan College of Engineering, Nagpur, during 1st Oct 2020.
13. An overview of Hydrogen Production –R&D status at online Short Term Training Programme (STTP) on "Fuel Cell Technologies for Hybrid and Electric Vehicles" conducted by MVGR College of Engineering, Vizianagaram, during 20th August 2020.

14. "Hydrogen Energy for sustainable future" at online_Faculty Development programme on "Emerging Trends in Energy, Environment and Nanomaterials. (EEN 2020) at Sri Vengateswara college of Engineering Chennai, during 27th July 2020.
15. Electrochemisty and its application in niche area" at Electrochemistry Webinar conducted by Sri Renganathar institute of Technology, Coimbatore during June 10,2020.
16. Overview of Hydrogen Production R&D status in India at National Seminar "Current Status on energy materials and Fuel cells held at S.A.Engg College, Chennai during March 6,2020.
17. Hydrogen and Fuel Cell Technology Development Programme at ARCI-CFCT & the way forward for green energy sector applications" at the 'National Convention on Electrochemist-21 (NCE-21) held at Vellore Institute of Technology, Chennai during Jan 30,2020.
18. The role of Functional Materials in Hydrogen Economy" at Second International Workshop on Functional Materials and Devices held at SRM institute of science and Technology, Chennai on 13th Dec 2019.
19. Thrust Areas for Research/funding at Faculty Development programme on Research Methodology and IPR held at Rajalakshmi Engineering College on 30th Nov 2019.
20. ARCI's Initiative towards e-mobility Programme" at NuGEN-2019 Mobility Summit held at I-CAT, Manesar, Delhi during 27-29th Nov 2019
21. Hydrogen energy Technology –An Overview Guest lecture delivered at Rural Energy Center, Gandhigram Rural Institute" Gandhigram on 30th Sep 2019.
22. Hydrogen- Fuel for sustainable future delivered Guest lecture at Christ University, Bangalore on 21st Sep 2019.
23. PEM based Water Electrolysis for Hydrogen production – Present status of Research and Development" at National workshop on Hydrogen Energy Technologies held at IISc, Bangalore on 19-20th Sep 2019.
24. Hydrogen – An Alternative Fuel for Clean Environment at Department of Chemical Engineering Seminar in Dr.MGR Educational & Research Institute, Chennai during July 17,2019.
25. An Alternative Fuel for Cleaner Environment at National conference on Clean Energy held at Sathyabama University, Chennai during April' 11,2019.
26. "Life-limiting aspects of the corrosion of components for PEM fuel cell" at the 'National Seminar on Electrochemical Corrosion and its Impacts on Industries in Tamilnadu' held at S.A. Engineering College, Chennai during Mach 8, 2019.
27. Hydrogen-A promising fuel and Energy Storage solution" at the Seminar on Energy Storage held at Alliance University, Bangalore during Feb 23, 2019.
28. Hydrogen & fuel cells –Fundamentals to applications" at faculty Development Program on "Energy Storage Applications held at Thiyagaraja College of Engineering, Madurai during Feb 24, 2019

29. "Hydrogen-A Promising Energy Storage solution" at the National Seminar "Energy Storage Devices" held at Sri Renganathar Institute of Engineering and Technology" Coimbatore during Jan 30, 2019
30. "Hydrogen energy Technology Development" at the Seminar on Renewable Energy Pathways for Rural Development held at Gandhigram Rural Institute" Gandhigram during Jan 31, 2019.
31. "An Introduction to Energy Storage Devices" held at Dept of Chemistry, Guest lecture S.A. Engineering College, Chennai During 19th Sep 2018.
32. "Opportunities and Challenges in Hydrogen Fuel Cell Technology Development" held at International Conference on Emerging Trends and Innovations in Engineering and Technological Research at ToC H institute of Science and Technology, Ernakulum, Kerala during 11-13 July 2018.
33. "A New Solution to the Renewable Energy intermittency issue" at workshop on Recent Advances in Materials for Photovoltaic Cells and Energy Storage Devices held at Thiagarajar College of Engineering (TCE), Madurai on February 22, 2018.
34. "The role of Material sciences in the development of Hydrogen Energy Technology" At Faculty Development Programme at ICTE QIP sponsored Workshop on "Frontiers in Materials Research for Energy Applications in Thiagarajar College of Engineering (TCE), Madurai. On 16th Dec 2017.
35. "Hydrogen fuel cell Technology-An Introduction" Seminar on Renewable Energy, conducted by Rural Energy Centre, Gandhigramam Rural Institute, Gandhigramam, Tamilnadu on 15th Dec' 2017.
36. "Hydrogen Energy- The perfect Energy source for sustainable Living" at workshop on Energy Technologies in Vellore Institute of Technology, Vellore, Tamilnadu on 09th Nov 2017.
37. "An overview of current developments in hydrogen energy technology" at National Seminar on "Recent Advancements in Energy Storage Technologies for Smart Grid Applications" in Mahalingam college of Engineering and Technology, Pollachi, Tamilnadu on 17th Dec 2016.
38. "Hydrogen Production Technology-An overview at Seminar in Neyveli Lignite Corporation Engineers Training centre, Neyveli, Tamilnadu on 10th June 2016.
39. "Hydrogen-fuel of future" at the National conference on Recent Development in chemistry, Sacred Heart College, Tirupattur, Vellore Dist. Tamilnadu on 24th Feb 2016.
40. "Hydrogen fuel cell Technology-An Introduction" Seminar on Renewable Energy, conducted by Rural Energy Centre, Gandhigramam Rural Institute, Gandhigramam, Tamilnadu on 18th Jan' 2016.
41. "PEM fuel cell technology for Sustainable future" at the National conference on Frontiers chemistry and Environment held at Dept of Chemistry, Abdul Hakeem College of engineering, Vellore on March 28, 2015.
42. "Material Aspects of Electrolytic Hydrogen generation" at the " National Conference on Advanced Materials in energy and Environmental Applications held at Dept of Physics, Bharathiyar University, Coimbatore on March 20, 2015
43. "Electrochemistry and its application-An introduction" "Workshop on Functional coatings Recent Trend at Thiagarajar College of Engineering, Madurai, Tamilnadu on 6th March 2015

44. Hydrogen and Fuel cell Technologies for Sustainable Future" Workshop on Fuel cell Technology at SCAD Engineering College, Tirunelveli, on 5th Jan 2015.
45. Hydrogen Energy Technology-An Overview " Guest Lecture for M.Tech Programme at Rural Energy Centre, Gandhigramam Rural Institute, Gandhigramam, Tamilnadu on 15th Dec' 2014.
46. Recent Trend in Hydrogen Production Technologies" National Seminar on Recent Research Trend in Chemistry Conducted by Abdul Hakeem College, Vellore, 26th Sep 2014.
47. Hydrogen fuel cell Technology-An Introduction" Seminar on Renewable Energy, conducted by Rural Energy Centre, Gandhigramam Rural Institute, Gandhigramam, Tamilnadu on 13th Dec' 2013.
48. "Hydrogen Generation by Electrolysis of Water-A Green Route" Seminar on Green Chemistry, Conducted by Dept. of Chemistry, Global Institute of Engg. & Technology, Vellore, Tamilnadu on 9th Nov 2013.
49. An Overview on hydrogen fuel cell technology" National Seminar on Current Scenario of Renewable Energy Resources in India, Conducted by Arulmigu Meenakshi amman college of Engineering, Kancheepuram, Tamilnadu on 19th Oct 2013.
50. Hydrogen-The fuel for Sustainable living" Chemistry Department Association meeting, Thiagarajar College of Engineering, Madurai, Tamilnadu on 6th Sep 2013.
51. Green electrolytes for Electrodeposition" National Seminar on "Green Chemistry" conducted by KSR College of Engineering, Thiruchengode, Tamilnadu, on 16th Feb 2012.
52. "Hydrogen Energy Technologies" Faculty Development Programme, Anna University Coimbatore, Tamilnadu, India, on 24th Dec 2011.

AWARDS AND HONOURS

- Received Outstanding Scientist Award in the field of hydrogen Energy Technology from Venus International Foundation, Chennai during Dec 2016.
- Biographical Profile selected and included in 32nd Edition of Marquis Who's who in the World' 2015.
- Cash prize award for the best paper, Electroplating and finishing in China, 2004.

EDITORIAL EXPERIENCE

- Reviewer in following International Journals
 International Journal of Hydrogen energy (ISSN 0360-3199)
 Corrosion Science (ISSN 0010-938X)
 Spectroscopy letters
 Surface and coating Technology (ISSN 0257-8972)
 Ceramic International (ISSN: 0272-8842)

Portugaliae Electrochimica Acta (ISSN 1647-1571)
 Ionics (ISSN 1862-0760)
 Journal of Materials Science-Materials in electronics (ISSN: 1573-482X)
 International journal of Energy Engineering (ISSN: 2225-6571)
 Chemical Engineering and Processing: Process Intensification (ISSN: 0255-2701)
 Nanoscale Research Letters (ISSN: 1556-276X)
 Waste Management journal, (ISSN 0956-053X)

MEMEBERSHIP IN PROFESSIONAL BODIES

- Member at subcommittee ASPIRE Programme launched by International Centre for Automotive Technology, Gurgaon
- Member –Hydrogen Association of India, Faridabad
- Fellow Member - Society for Advancement of Electrochemical Science and Technology (SAEST), India
- Anna university, Chennai Recognized PhD degree supervisor
- Guest lecturer at Gandhigramam Rural Institute, Gandhigramam, Tamilnadu.
- Doctoral committee member at
 Department of Chemical Engineering, Anna University, Chennai,
 Department of Chemistry, Sathyabama University, Chennai.
 Department of Chemistry, SRM University, Kattangulathur, Chennai
 Department of Chemistry, B. S. Abdur Rahman University, Chennai
- Ph.D viva-Voice External Expert examiner/member at Dept. of Chem. Engg. Anna University, Chennai.TN

COUNTRY VISITED

JAPAN, London, UK., Canada

ACADEMIC THESIS SUPERVISION

| Degree | Numbers |
|----------------------|--------------------------------|
| Post Doctoral Fellow | 01 |
| Ph.D | 01(completed) 02 (on-going) |
| M.Tech/M.E | 06 |
| M.Phil | 03 |
| M.Sc | 18 |
| B.Tech | 06 |