

Dr. C. PRIJI

Project Scientist

Centre for Fuel Cell Technology (CFCT)

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)

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Education

2013-2019 Ph.D

Department of Physics

Indian Institute of Technology Madras, Tamilnadu, India

Thesis Title: Study of Electrochemical Characteristics of Carbon Nanocomposites for Fuel Cell and Sodium-Ion Batteries

2012-2013 M. Tech in Solid State Technology (upgraded to Dual Degree Programme- M.Tech + Ph.D)

Department of Physics

Indian Institute of Technology Madras, Tamilnadu, India

2008-2009 Bachelor Of Education

N.S.S College Ottapalam, Kerala, India

Physical Science

2006-2008 Master of Science (Physics)

Department of Physics

Govt. Victoria College Palakkad (Calicut University) Kerala, India

2003-2006 Bachelor of Science (Physics)

Department of Physics

Govt. Victoria College Palakkad (Calicut University) Kerala, India

Professional Experience

2022 Oct – Present

Project Scientist • ARCI • IITM Research Park • Chennai • Tamilnadu, India

2020 Nov – 2022 Sep

Faculty (On contract) • Anna University, CEG Campus • Chennai • Tamilnadu, India

2019 July – Nov

Project Officer • IIT Madras • Chennai • Tamilnadu, India

2019 April – June

Project Associate • IIT Madras • Chennai • Tamilnadu, India

2010 – 2012

Full-Time teaching experience for Engineering Diploma • Govt. Polytechnic College Palakkad • Kerala, India

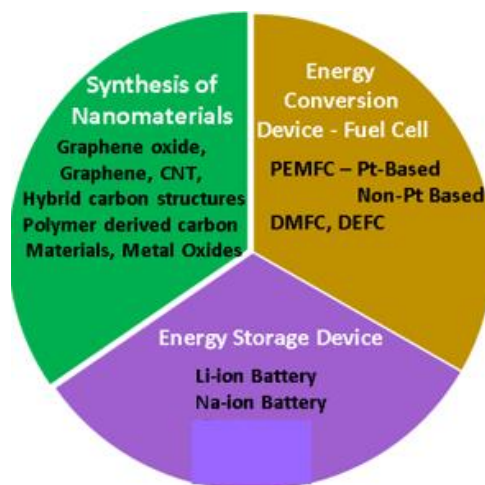
Scholastic Achievements

- Awarded 'Best PhD thesis award in Energy/Physics-2019' – IIT Madras 2019
- Work done during Ph.D. was published in 'Nano Digest' (India's premiere magazine on Nanotechnology) as "Proton Exchange Membrane Fuel Cell Challenge" in January 2018.
- **Mrs. Lakshmi Ravikumar Memorial Prize** for securing the highest CGPA in I & II Semester in M.Tech,2013, IIT Madras
- Qualified Graduate Aptitude Test in Engineering (**GATE**)-2012
- Qualified Central Teacher Eligibility Test (**CTET**)-2012

Scientific Expertise and Technical Skills

Scientific Expertise	Technical Skills
<ul style="list-style-type: none"> • Chemical Vapor Deposition Technique • Membrane Electrode Assembly Fabrication • Assembling Single-Fuel Cell set up & Testing • Fabricating Swage-locks & Coin Cells using Glove Box • CNT synthesis by CCVD technique • Graphene synthesis by hydrogen & thermal exfoliation • Electrocatalyst Preparation 	<ul style="list-style-type: none"> • Confocal Raman Spectrometer • FTIR Spectrometer • TGA-DSC Instrument • Dielectric Impedance Spectrometer • TELEDYNE MEDUSA™ RD Fuel Cell Test Station • KPAS Fuel Cell Test Station • Metrohm Autolab Electrochemical Work Station • CH Instruments Inc. • BioLogic SP 300 Electrochemical Instruments

Research Summary



- Synthesis and task specific surface modification of carbon nanostructures like graphene oxide, graphene, carbon nanotubes, hybrid carbon nanocomposites, polymer derived carbon materials and metal oxides.

- Synthesis of heteroatom doped and polymer derived carbon nanocomposites.
- Development of functional electrode materials for electrochemical conversion and storage devices like polymer electrolyte membrane fuel cell, direct alcohol fuel cell, lithium-ion battery and sodium-ion battery.
- Construction and demonstration of fully platinum-free polymer electrolyte membrane fuel cell for the first time.
- Study of hydrogen oxidation reaction, oxygen reduction reaction, ethanol and methanol oxidation reaction.
- Study of electrochemical performance of various types of rechargeable batteries using efficient anode materials.

Projects Involved in during Ph.D

- Development of non-Pt electrocatalysts for hydrogen Proton Exchange Membrane Fuel Cells, (2016-2017)
- Nitrogen doped partially exfoliated multi-walled carbon nanotubes - PtRu nanoparticle hybrids as high performance anode for direct methanol fuel cells, (2016-2019)

List of Publications

- Palladium-nitrogen coordinated cobalt alloy towards hydrogen oxidation and oxygen reduction reactions with high catalytic activity in renewable energy generations of proton exchange membrane fuel cell, **Applied Energy**.
Arpita Ghosh, **Priji Chandran**, S. Ramaprabhu, 2017, 208, 37-48.
- High-performance Platinum- free oxygen reduction reaction and hydrogen oxidation reaction catalyst in polymer electrolyte membrane fuel cell, **Scientific Reports**.
Priji Chandran, Arpita Ghosh and Sundara Ramaprabhu, 2018, 8, 3591.
- Catalytic performance of non-Platinum-based hybrid carbon hetero-structure for oxygen reduction and hydrogen oxidation reactions in Proton Exchange Membrane Fuel Cell, **International Journal of Hydrogen Energy**.
Priji Chandran and Sundara Ramaprabhu, 2018, 43, 18477-18487.
- 1D-2D integrated hybrid carbon nanostructure supported bimetallic alloy catalyst for ethanol oxidation and oxygen reduction reactions, **International Journal of Hydrogen Energy**.
Priji Chandran, Divya P and S Ramaprabhu, 2019, 44, 4951-61.
- In-situ nitrogen doped, defect induced carbon nanotubes as an efficient anode towards sodium-ion battery, **Nanotechnology**,
Rashmi Chandrabhan Shende^{*}, **Priji Chandran**^{*}, and Sundara Ramaprabhu. [^{*} **Equal contribution**], 2020, 31, 235403.
- Outstanding fuel cell performance of a fully platinum-free electrocatalysts using a cost-effective catalyst support material, Beistein Archives.
Priji Chandran and Sundara Ramaprabhu ,2020(1),10,2020

Conference Presentations

- Priji C. and Ramaprabhu S. Oral Presentation on “Pt-Ru decorated partially exfoliated multiwalled carbon nanotubes as efficient anode electro catalysts for DMFC”, NANOS2015, GITAM Institute of Science, Visakhapatnam, India, December, 14-17, 2015.
- Priji C. and Ramaprabhu S. Oral Presentation on “Palladium alloy based nanocomposite as an efficient anode and cathode electrocatalyst for PEMFC”, 232nd ECS Meeting, Washington D.C., October 1-5, 2017.
- Priji C. and Ramaprabhu S. Poster Presentation on “Palladium Cobalt alloy based nanocomposite as efficient anode and cathode electrocatalyst for polymer electrolyte membrane fuel cell”, 4th Physics In-house Symposium, IIT Madras, Nov 3 and 4, 2017.

Grants

- Institute Travel Grant, IIT Madras – Travel grant to attend 232 nd ECS meeting, Washington DC, October 1-5, 2017.

Workshop Participation

- GIAN Course on “Tailored and tunable properties of nanomaterials”, IIT Madras, India, 3-17th March, 2016.
- Bringing the Nanoworld Together, IIT Madras, Chennai, India, Nov 3 and 4, 2015.