

Mr. PRASANTA PATTANAYAK

Advance Polymer Technology Laboratory
Department of Polymer Science & Technology
University of Calcutta
Kolkata-700009

E-Mail: ppattanayak.chem@gmail.com
pppst_rs@caluniv.ac.in

Phone No: +91-9123781568/+91-9647775388

Key point health issue: Orthopedic Handicapped (OH)



Date of Birth – 22/02/1989

Sex – Male

Marital Status- Single

Permanent Address

Vill. - Uttar Gopalpur, P.O- Dalpara, P.S.- Panskura

Dist.- Purba Medinipur, 721167, West Bengal, India

EDUCATION

1. *Rajabazar Science College, University of Calcutta, Kolkata*

- ❖ **Ph.D., (Thesis Submitted) February-2020, Thesis title:** Development of Cost Effective Catalyst for Fuel Cell Application: Studies on Transition Metal Based Catalyst Supported on Conducting Polymers.
- ❖ **Master of Technology (M.Tech)**, Polymer Science and technology, 2014, **Percentage- 84%**.

2. *Sant Longowal Institute of Engg. & Tech. (SLIET) (Deemed University, Govt. of India), Punjab*

- ❖ **Bachelor of Engineering (B.E), Chemical Engineering**, June 2012. **CGPA – 8.91/10.**
- ❖ **Diploma, Chemical Technology**, June 2009. **Percentage- 80.14%.**

RESEARCH

I have worked on two types of fuel cell named direct methanol fuel cell (DMFC) and microbial fuel cells (MFCs) and on a variety of problems involving during my Ph.D. tenure. The traditionally used anode (Pt-Ru/C) and cathode catalysts (such as Pt/C) are expensive and also yield significantly low rate of methanol oxidation reaction (MOR) and oxygen reduction reaction (ORR) due to the high chances of poisoning effect of catalyst and microbial contamination for DMFCs and MFCs. In this context, the main focus of my research work has been divided in three aspects namely- (i) development of cost effective catalyst, (ii) study of electrochemical analysis, and (iii) fuel cell application. At first, I have focused on the development of metal free or transition metal based catalyst supported on conducting polymers catalyst by simple chemical reduction method. The successfully synthesized low cost metal free or transition metal based catalyst were then carefully examined by different characterization methods like Fourier-transform infrared spectroscopy (FTIR), X-ray powder diffraction (XRD), Field Emission Scanning Electron Microscope (FE-SEM), Transmission electron microscopy (TEM), BET surface, X-ray photoelectron spectroscopy (XPS), Raman, Thermogravimetric analysis (TGA), and Ultraviolet-visible spectroscopy (UV) etc. A

part of my work on electrochemical activity of the synthesized catalyst, mainly focused on two aspects, namely, (MOR and ORR) and their stability was examined through cyclic voltammetry (CV) and chronoamperometry (CA). The superior electrocatalytic activity and higher stability results were achieved by the synthesized catalyst over traditional used Pt/C catalyst; and thereafter they were applied in to DMFC and MFC. Consequently, due to the superior electrochemical and other properties, the prepared nano-hybrid system can be implemented as anode and cathode materials in order to yield high performance of DMFC and MFCs.

Precisely, I have focused on the development of low cost anode and cathode catalyst instead of commercially available high cost catalyst, thereby decreasing the overall cost of the fuel cell. Reactive mixing in many cases change the electrical properties of a system, wherein lies the primary focus of this work. In particular, I have focused on estimating the changes in properties such as electrical conductivity, oxidation and reduction potential and fuel cell application (power density) owing to reactive electrochemical processes.

LIST OF PUBLICATIONS

Journal Publications

1. **Prasanta Pattanayak**, Nilkamal Pramanik, Piyush Kumar, Patit Paban Kundu “Fabrication of cost- effective non-noble metal supported on conducting polymer composite such as copper/polypyrrole - graphene oxide (Cu₂O/PPy-GO) as an anode catalyst for methanol oxidation in DMFC”. International journal of hydrogen energy (elsevier), 2018, 43, 11505-11519, Impact Factor (I.F)- 4.08.
2. **Prasanta Pattanayak**, Farhan Papiya, Vikash kumar, Nilkamal Pramanik and Patit Paban Kundu, “Deposition of Ni-NiO nanoparticles on the reduced graphene oxide filled polypyrrole: evaluation as cathode catalyst in microbial fuel cells”. Sustainable Energy & Fuels (RSC), 2019,3, 1808-1826, Impact Factor (I.F)- 4.912.
3. **Prasanta Pattanayak**, Nilkamal Pramanik, Farhan Papiya, Vikash Kumar, Patit Paban Kundu*, “Metal- free keratin modified poly(pyrrole-co-aniline)-reduced graphene oxide based nanocomposite materials: A promising cathode catalyst in microbial fuel cell applications”. Journal of Environmental Chemical Engineering (elsevier), 2020, 8, 103813.
4. **Prasanta Pattanayak**, Farhan Papiya, A. Singh, P. P. Kundu, “Performance evaluation of poly(aniline-co- pyrrole) wrapped titanium dioxide nanocomposite as air-cathode catalyst material for Microbial fuel cell”. Materials Science and Engineering: C (elsevier) (revision submitted).
5. Farhan Papiya, **Prasanta Pattanayak**, Piyush Kumar, Vikash Kumar, Patit Paban Kundu, “Development of highly efficient bimetallic nanocomposite cathode catalyst, composed of Ni: Co supported sulfonated polyaniline for application in microbial fuel cells”. Electrochimica Acta (elsevier), 2018, 282, 931-945, Impact Factor (I.F)- 5.383.
6. Farhan Papiya, Suparna Das, **Prasanta Pattanayak** and Patit Paban Kundu, “Fabrication of silane modified graphene oxide supported Ni-Co bimetallic electrocatalysts: a catalytic system for superior oxygen reduction in microbial fuel cell”. International journal of hydrogen energy (elsevier), 2019, 44, 25874-25893. Impact Factor (I.F)- 4.08.
7. Farhan Papiya, **Prasanta Pattanayak**, Vikash Kumar, Suparna Das and Patit Paban Kundu*, “Sulfonated graphene oxide and titanium dioxide coated with nanostructured polyaniline nanocomposites as an efficient cathode catalyst in microbial fuel cells”. Materials Science and Engineering: C (elsevier), 2020, 108, 110498. **Impact Factor (I.F)- 4.959.**

List of Book chapter

1. Ruchira Rudra, **Prasanta Pattanayak**, Patit Paban Kundu, “Conducting Polymer-Based Microbial Fuel Cell”. **Enzymatic Fuel Cells: Materials and Applications**, Volume No.-44, Page No.-173-187, February 2019, **Publisher- Material Research Forum LLC (US)**.

Conference Publications

1. **Prasanta Pattanayak**, Patit Paban Kundu, “Development of a bimetal copper-Ruthenium anode catalyst supported on polypyrrole-graphene oxide nanocomposite for methanol oxidation”. **SCI No. of the Conference Proceeding-** 978-81-8211-146-2©2019 GCELT, **Name of the International Confereee-** International conference on Emerging Technology for Sustainable development (ICETSD-19), Government College of Engineering and Leather Technology, Kolkata, 5th -6th March, 2019.

List of the National and internationally renowned conference Presentation/ Short Term Course

1. **Prasanta Pattanayak**, Patit Paban Kundu, “Development of an alternative copper anode catalyst supported on polypyrrole-graphene oxide composite for application in direct methanol fuel cell”. **International conference on chemical engineering and advanced polymeric materials (ICEAPM-2016)**, 18-20 August 2016, **BIT –Misra, Jharkhand. (Poster)**.
2. **Prasanta Pattanayak**, Patit Paban Kundu, “Development of an alternative copper anode catalyst supported on polypyrrole-reduced graphene oxide composite for application in direct methanol fuel cell”. **2nd International conference on Harnessing Engineering, Technology & Innovation for Sustainable Growth (HETIS-2016)**, September 30- October 01, 2016, **Panjab University, Chandigarh. (Poster)**.
3. **Prasanta Pattanayak**, **Short term course on “Industrial Engineering: A Parading Shift in Manufacturing and Service Industry”**. Dr B R Ambedkar National Institute of Technology (NIT), **TEQIP-III Sponsored Short Term Course**, 6 to 10 July 2018, **(NIT-Jalandhar), (Participated)**.
4. **Prasanta Pattanayak**, Farhan Papiya, Patit Paban Kundu, “Surface modified keratin on poly(pyrrole-co-aniline)-reduced graphene oxide structure: A novel cathode catalyst in microbial fuel cell applications”. **International conference cum Expo on Innovation in Materials Science & Technology (IMST-2018)**, **Amity University, Kolkata**, 14th -16th December 2018. **(Poster)**.
5. **Prasanta Pattanayak**, Patit Paban Kundu, “Development of a bimetal copper-Ruthenium anode catalyst supported on polypyrrole-graphene oxide nanocomposite for methanol Oxidation”. **International conference on Emerging Technology for Sustainable development, Government College of Engineering and Leather Technology, Kolkata**, 5th -6th March, 2019. **(Poster)**.

Fellowship Details

1. **NFPWD-UGC Fellowship (2014-2019) in PhD.**
2. Awarded by **TEQIP (Phase-II) Fellowship (2013-2014) in M.Tech.**
3. Qualified **GATE (All India Rank: 830) in Engineering Science (2013)**.
4. Awarded tuition fee waiver scheme (**TFW**) (2009-2012) in **BE**.

Achievements

1. **Silver medalist** in B.E, Sant Longowal Institute of Engg. and Tech., Govt. of India, Longowal, Punjab, 2012.
2. First prize in Model Exhibition in techfest 11 in working model, 3rd prize in poster presentation in techfest 11, First prize in Model Exhibition in techfest 10 in working model, Executive Member in the ISTE from the year 2009 to 2010 in SLIET.
3. Poster Presentation in ICEAPM (2016) at BIT Mesra (Ranchi), HETTS (2016) at Panjab University (Chandigarh), CHEMCON (2017) at Haldia Institute of Technology (Haldia).

REFERENCES

1. **Prof. Patit Paban Kundu (Supervisor)**,
Department of Chemical Engineering,
Indian Institute of Technology, Roorkee,
Roorkee- 247667, Uttarakhand, India.
Email Id:- ppkfch@iitr.ac.in
ppk923@yahoo.com
Ph no- +917251040403.
2. **Prof. Haripada Bhunia (HOD)**
Department of Chemical Engineering,
Thapar Institute of Engineering & Technology (Deemed to be University),
Patiala- 147004, Punjab, India
Email Id:- hbhunja@thapar.edu
Ph no- +919316682355.
3. **Prof. Dipankar Chattopadhyay**
Dept. of Polymer Science & Tech.,
University of Calcutta,
92- A.P.C Road, Kolkata-700009,
Email Id:- dipankar.chattopadhyay@gmail.com
Ph no- +919433379034

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