Dr. ANJAN BANERJEE

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Personal Information

Date of Birth: 24 October 1984
Nationality: Indian
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Professional Experience

- Assistant Professor – Department of Chemistry, Presidency University, Kolkata, India from 03 October 2018 to present
  Research Area: *Materials Electrochemustry and Energy Storage Systems*
  Teaching Area: *Inorganic and Materials Chemistry (Under and Post Graduate)*

- Sr. Manager – Design (Electrochemistry) in Godrej-UEP Project at Godrej and Boyce Mfg. Co. Ltd., India from 10 September 2018 to 29 September 2018
  Research Area: *MnO_2/Zn Secondary Batteries*

- Scientist – Materials R&D in Lead-Carbon Project at Livguard Energy Technologies Pvt. Ltd., India from 04 April 2017 to 10 August 2018
  Research Area: *Carbonaceous Materials in Lead-Acid Batteries*

- Post-Doctoral Research Fellow – Department of Chemistry, Bar-Ilan University, Israel with Prof. D. Aurbach from 01 February 2015 to 20 March 2017
  Research Areas: *Li-Ion and Lead-Acid Batteries*

- Research Associate – Solid State and Structural Chemistry Unit (SSCU), Indian Institute of Science, India with Prof. A. K. Shukla from 25 June 2014 to 13 January 2015
  Research Areas: *Asymmetric/Hybrid Supercapacitors and Flow Batteries*

- Research Fellow (PhD) – Solid State and Structural Chemistry Unit (SSCU), Indian Institute of Science, India with Prof. A. K. Shukla from 03 August 2009 to 24 June 2014
  Research Areas: *Lead-Carbon Hybrid Ultracapacitors*

Research Projects

02. Aqueous Energy Storage Devices by Coupling of Na-Ion Battery and Pseudocapacitor for Photovoltaic Applications
Funding Agency: University Grants Commission (UGC), India
Sanction Order No.: F.30-509/2020(BSR), dated 31.01.2020
Sanctioned Amount: 10,00,000 INR
Duration: 3 Years
Status: Completed

01. Aqueous Na-Ion Batteries with Organic Anodes for Load-Leveling Applications
Funding Agency: Science and Engineering Research Board (SERB), India
Sanction Order No.: SRG/2019/000296, dated 24.10.2019
Sanctioned Amount: 24,94,000 INR
Duration: 2 Years
Status: Completed

Patents

07. Aqueous Energy Storage Device, **A. Banerjee**, P. Naskar, S. Debnath and A. Maiti, Indian Patent Application No: 202231010840; filed on 28.02.2022. Publication Date (U/S 11A): 01.09.2023.

06. Acid-Scavenging Functional Separators for Power Performance of Lithium Ion Electrochemical Cells, S. Luski, D. Aurbach, T. J. Fuller, I. C. Halalay, **A. Banerjee**, B. Ziv and K. Raghunathan, US Patent Grant No: US 10741812 B2; dated 11.08.2020.

05. Lithium Ion Battery, S. Luski, D. Aurbach, I. C. Halalay, T. J. Fuller, B. R. Powell Jr, **A. Banerjee**, Y. Shilina and B. Ziv, US Patent Grant No: US 10008749 B2; dated 26.06.2018.

04. Lithium Ion Battery, S. Luski, D. Aurbach, B. R. Powell Jr, I. C. Halalay, T. J. Fuller, **A. Banerjee**, Y. Shilina and B. Ziv, US Patent Grant No: US 10050313 B2; dated 14.08.2018.

03. Novel Bipolar Plate for use in Redox Flow Batteries, A. K. Shukla and **A. Banerjee**, Indian Patent Grant No: 332130; dated 17.02.2020.

02. Cost Effective Energy Storage Device and Methods Thereof, A. K. Shukla and **A. Banerjee**, Indian Patent Grant No: 348562; dated 05.10.2020.

01. An Energy Storage Device, an Inorganic Gelled Electrolyte and Methods Thereof, A. K. Shukla, **A. Banerjee**, M. K. Ravikumar and S. A. Gaffoor, Indian Patent Grant No: 313903; dated 10.06.2019; US Patent Grant No: US9036332 B2; dated 19.05.2015.

Book Chapter

01. Lead-Carbon Hybrid Ultracapacitors and their Applications (Chapter 8), A. K. Shukla, **A. Banerjee**, and M. K. Ravikumar, in "*Electrochemically Enabled Sustainability: Devices, Materials, and Mechanisms for Energy Conversion"*, K. Y. Chan, C. Y. V. Li, editor(s), CRC Press, Taylor & Francis Group, ISBN 9781466575431 (2014).

Publications in Journals

38. Differential Supercapacitor and Schottky Diode behaviours in Two New Isostructural Coordination Polymers Based on Redox Active Metal Ions, C. Das, S. Debnath, V. D. Patel, D. Gupta, **A. Banerjee*** and P. Mahata*, *CrystEngComm*., 25 (2023) 6343.

37. An Enduring Na-Ion Solar Battery Configured with $Na_2Co_{0.5}Ni_{0.5}Fe(CN)_6$ Positive and $NaTi_2(PO_4)_3$ Negative Electrodes in Na_2SO_4-SiO_2 Hydrogel Electrolyte, P. Naskar, S. Mondal, B. Biswas, S. Laha* and **A. Banerjee***, *J. Electrochem. Soc*., **170** (2023) 090535.

36. Low Cost & Quasi Solid State $Na_2Mn_{0.5}Ni_{0.5}Fe(CN)_6$//$Na_xFe_2O_3$ Hybrid Na-Ion Batteries for Solar Energy Storage, P. Naskar, S. Mondal, B. Biswas, S. Laha* and **A. Banerjee***, *Sustainable Energy Fuels*, **7** (2023) 4189.

35. High-Performance and Scalable Aqueous Na-Ion Batteries Comprising a Co-Prussian Blue Analogue Framework Positive Electrode and Sodium Vanadate Nanorod Negative Electrode for Solar Energy Storage, P. Naskar, S. Debnath, B. Biswas, S. Laha* and **A. Banerjee***, *ACS Appl. Energy Mater*, **6** (2023) 4604.

34. Low-Cost and Scalable Ni-Prussian Blue Analogue//Functionalized Carbon based Na-Ion Systems for all Climate Operations, P. Naskar, S. Debnath, A. Maiti, B. Biswas, and **A. Banerjee***, *ChemPhysChem*, **24** (2023) e202300051 (***Cover page***).

33. Lithium Ion Batteries: Indispensable Assets for "Rechargeable World", P. Naskar, S. Debnath, N. Mukherjee, and **A. Banerjee***, *Resonance: Journal of Science Education*, **28** (2023) 577.

32. Rechargeable Manganese Dioxide−Zinc Batteries: A Review Focusing on Challenges and Optimization Strategies under Alkaline and Mild Acidic Electrolyte Media, S. Debnath, A. Maiti, P. Naskar, **A. Banerjee***, *ChemNanoMat*, **8** (2022) e202200261.

31. Frontiers in Hybrid Ion Capacitors: A Review on Advanced Materials and Emerging Devices, P. Naskar, D. Kundu, A. Maiti, P. Chakraborty, B. Biswas, and **A. Banerjee***, *ChemElectroChem*, **8** (2021) 1393 (***Cover page***).

30. Chemical Supercapacitors: A Review Focusing on Metallic Compounds and Conducting Polymers, P. Naskar, A. Maiti, P. Chakraborty, D. Kundu, B. Biswas and **A. Banerjee***, *J. Mater. Chem. A*, **9** (2021), 1970.

29. Envisaging Future Energy Storage Materials for Supercapacitors: An Ensemble of Preliminary Attempts, P. Naskar, P. Chakraborty, D. Kundu, A. Maiti, B. Biswas, and **A. Banerjee***, *ChemistrySelect*, **6** (2021) 1127.

28. LNMO-graphite cells performance enhancement by the use of acid scavenging separators, Y. Shilina, S. Maddukuri, **A. Banerjee**, B. Ziv, S. Luski, D. Aurbach and I. C. Halalay, *ChemElectroChem*, **6** (2019) 3690.

27. Multifunctional Separators: A Promising Approach for Improving the Durability and Performance of Li-Ion Batteries, **A. Banerjee**, B. Ziv, Y. Shilina, J. M. Ziegelbauer, H. Liu, K. J. Harris, G. Botton, G. R. Goward, S. Luski, D. Aurbach and I. C. Halalay, *J. Electrochem. Soc*., **166** (2019) A5369.

26. The Effectiveness of Multifunctional Li-Ion Battery Separators Past Their Saturation with Transition Metal Ions, **A. Banerjee**, B. Ziv, S. Luski, D. Aurbach and I. C. Halalay, *J. Electrochem. Soc*., **165** (2018) A2096 (***Editor's Choice***).

25. Elucidating the Li-Ion Battery Performance Benefits Enabled by Multifunctional Separators, H. Liu, **A. Banerjee**, B. Ziv, K. J. Harris, N. P. W. Pieczonka, S. Luski, G. A. Botton, G. R. Goward, D. Aurbach and I. C. Halalay, *ACS Appl. Energy Mater*., **1** (2018) 1878.

24. Acid-Scavenging Separators: A Novel Route for Improving the Li-Ion Batteries' Durability, **A. Banerjee**, B. Ziv, Y. Shilina, S. Luski, D. Aurbach and I. C. Halalay, *ACS Energy Lett*., **2** (2017) 2388.

23. On the Oxidation State of Manganese Ions in Li-Ion Battery Electrolyte Solutions, **A. Banerjee**, Y. Shilina, B. Ziv, J. M. Ziegelbaure, S. Luski, D. Aurbach and I. C. Halalay, *J. Am. Chem. Soc*., **139** (2017) 1738.

22. Single-Wall Carbon Nanotube Doping in Lead-Acid Batteries: A New Horizon, **A. Banerjee**, B. Ziv, Y. Shilina, E. Levi, S. Luski and D. Aurbach, *ACS Appl. Mater. Interfaces*, **9** (2017) 3634.

21. Multifunctional Materials for Enhanced Li-Ion Batteries Durability: A Brief Review of Practical Options, **A. Banerjee**, Y. Shilina, B. Ziv, J. M. Ziegelbaure, S. Luski, D. Aurbach and I. C. Halalay, *J. Electrochem. Soc*., **164** (2017) A6315.

20. Increasing the Durability of Li-Ion Batteries by Means of Manganese Ion Trapping Materials with Nitrogen Functionalities, **A. Banerjee**, B. Ziv, S. Luski, D. Aurbach and I. C. Halalay, *J. Power Sources*, **341** (2017) 457.

19. Multifunctional Manganese Ions Trapping and Hydrofluoric Acid Scavenging Separator for Lithium Ion Batteries Based on poly(ethylene-*alternate*-maleic acid)

dilithium salt, **A. Banerjee**, B. Ziv, Y. Shilina, S. Luski, I. C. Halalay and D. Aurbach, *Adv. Energy Mater.*, **7** (2017) 1601556.

18. Single-wall Carbon Nanotubes Embedded in Active Masses for High-Performance Lead-Acid Batteries, **A. Banerjee***, B. Ziv, E. Levi, Y. Shilina, S. Luski and D. Aurbach, *J. Electrochem. Soc*., **163** (2016) A1518.

17. Improving Stability of Li-Ion Batteries by Means of Transition Metal Ions Trapping Separators, **A. Banerjee***, B. Ziv, Y. Shilina, S. Luski, D. Aurbach and I. C. Halalay, *J. Electrochem. Soc*., **163** (2016) A1083.

16. Combined Electron Paramagnetic Resonance and Atomic Absorption Spectroscopy/Inductively Coupled Plasma Analysis as Diagnostics for Soluble Manganese Species from Mn-Based Positive Electrode Materials in Li-Ion Cells, Y. Shilina, B. Ziv, A. Meir, **A. Banerjee**, S. Ruthstein, S. Luski, D. Aurbach and I. C. Halalay, *Anal. Chem*., **88** (2016) 4440.

15. 1 V Supercapacitor Device with Nanostructured Graphene Oxide/Polyaniline Composite Materials, D. Kumar, **A. Banerjee***, S. Patil and A. K. Shukla, *Bull. Mater. Sci*., **38** (2015) 1507.

14. Enhanced Performance of Starter Lighting Ignition Type Lead-Acid Cells with Carbon Nanotubes as an Additive to the Active Mass, R.Marom, B.Ziv, **A. Banerjee**, B. Cahana, S. Luski and D. Aurbach, *J. Power Sources*, **296** (2015) 78.

13. Studies on 12 V Substrate-Integrated Lead-Carbon Hybrid Ultracapacitors, **A. Banerjee** and A. K. Shukla, *J. Chem. Sci*.,**127** (2015) 967.

12. A Photovoltaic Stand-alone Lighting System with Polymeric-Silica-Gel-Electrolyte-Based Substrate-Integrated Lead-Carbon Hybrid Ultracapacitors, **A. Banerjee**, S. K. Ramasesha and A. K. Shukla, *Electrochem. Energy Technol*., **1** (2015) 10.

11. Series Connected Substrate-Integrated Lead-Carbon Hybrid Ultracapacitors with Voltage-Management Circuit, **A. Banerjee***, R. Srinivasan and A. K. Shukla, *Bull. Mater. Sci*., **38** (2015) 129.

10. Performance Comparison for 12 V Lead-Carbon Hybrid Ultracapacitors with Substrate-Integrated and Conventional Pasted-Positive Plates, **A. Banerjee** and A. K. Shukla, *Ionics*, **21** (2015) 201.

09. Design of Substrate-Integrated Lead-Carbon Hybrid Ultracapacitor and Experimental Validation, **A. Banerjee**, R. Srinivasan and A. K. Shukla, *ECS Electrochem. Lett.*, **3** (2014) A1.

08. Influence of Binder Solvents on Carbon-Layer Structure in Electrical-Double-Layer Capacitors, **A. Banerjee**, P. Suresh Kumar and A. K. Shukla, *J. Chem. Sci*., **125** (2013) 1177.

07. 12 V / kilo-Farad Range Lead-Carbon Hybrid Ultracapacitors and Their Envisaged Applications, A. K. Shukla, **A. Banerjee**, A. Jalajakshi and M. K. Ravikumar, *ECS Trans*., **50** (2013) 367.

06. A Soluble-Lead Redox Flow Battery with Corrugated Graphite Sheet and Reticulated Vitreous Carbon as Positive and Negative Current Collectors, **A. Banerjee**, D. Saha, T. N. Guru Row and A. K. Shukla, *Bull. Mater. Sci*., **36** (2013) 163.

05. Electrochemical Capacitors: Technical Challenges and Prognosis for Future Markets, A. K. Shukla, **A. Banerjee**, M. K. Ravikumar and A. Jalajakshi, *Electrochim. Acta*, **84** (2012) 165.

04. A 12 V Substrate-Integrated PbO_2-Activated Carbon Asymmetric Hybrid Ultracapacitor with Silica-Gel-Based Inorganic-Polymer Electrolyte, **A. Banerjee**, M. K. Ravikumar, A. Jalajakshi, S. A. Gaffoor and A. K. Shukla, *ECS Trans*., **41** (2012) 101.

03. Substrate-Integrated Lead-Carbon Hybrid Ultracapacitor with Flooded, Absorbent-Glass-Mat and Silica-Gel Electrolyte Configurations, **A. Banerjee**, M. K. Ravikumar, A. Jalajakshi, P. Suresh Kumar, S. A. Gaffoor and A. K. Shukla, *J. Chem. Sci*., **124** (2012) 747 **(Cover Page)**.

02. Synthesis, characterization and catecholase-like activity of [Mn2L2(l1,5-dca)2(dca)2]_H2O [L5N,N0-ethylenebis(2-benzoylpyridineimine), dca 5 dicyanamide], P. Maiti, T. Ghosh, **A. Banerjee**, A. Banerjee, S. Bhattacharya, E. Suresh and D. Das, *Transition Met. Chem*., **36** (2011) 195.

01. Electrical-energy storage in hybrid ultracapacitors, M. K. Ravikumar, E. Niranjana, A. Sundar Rajan, **A. Banerjee**, S. A. Gaffor and A. K. Shukla, *J. Indian Inst. Sci.*, **89** (2009) 455.

Invited Lectures

03. Two-day workshop 'How to master analytical methods in Chemistry − A few illustrations' at Department of Chemistry, Ramakrishna Mission Vidyamandira, Belur Math, Howrah-711202, India
Title of the Presentation: Indispensable Assets for "Rechargeable World" Lithium Ion Batteries
Date: 13 October, 2023

02. Two Day International Conference on "Contemporary Ideas, Innovations & Initiatives in Chemical Sciences-2023 (CI3CS-2023)" at Department of Chemistry, Presidency University, Kolkata, Kolkata-700073, India
Title of the Presentation: Low Cost Aqueous Na-Ion Batteries: Promising Alternative for Solar Energy Storage
Date: 24 August, 2023

01. One Day Seminar on “Life and Works of Professor Acharya Prafulla Chandra Ray” at Department of Chemistry, Kazi Nazrul University, Asansol- 713340, India
Title of the Presentation: Know Your Electronic Gadgets Better…
Date: 02 August, 2019