

# Dr. Joyita Banerjee

**CSIR-Post-doctoral Research Associate**  
Department of Chemical Engineering  
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## Current Affiliation

**CSIR-Post-doctoral Research Associate**

*April 2019 – Till current*

Department of Chemical Engineering

**Hosts:** Prof. Sri Sivakumar

**Research:** Transition metal oxide based flexible photo-pseudocapacitor

## Academic Employment

**Senior Project Engineer**

*December 2017 – April 2019*

Department of Chemical Engineering

**Host:** Prof. Sri Sivakumar

**Research:** Transition metal oxide based flexible photo-pseudocapacitor

**Post-Doctoral Associate**

*May 2016 – July 2017*

University of Pittsburgh, Pittsburgh, Pennsylvania, USA

**Host:** Dr. Sachin Velankar

**Research:** Desalination of water using the concept of polymer-water phase behavior

## Education

**Doctor of Philosophy (Ph.D.) - 2016** (GPA – 9.25/10.00)

Department of Metallurgical Engineering and Materials Science

Indian Institute of Technology, Bombay, India

**Thesis title:** Investigation on the dispersion extent of multiwalled carbon nanotubes in polypropylene/multiwalled carbon nanotubes composites

**Thesis supervisor:** Prof. Arup R. Bhattacharyya

**Master of Technology (M.Tech) - 2011** (1st class; 84%)

Department of Polymer Science and Technology

University College of Science, Technology & Agriculture

University of Calcutta, Kolkata, India

**Thesis title:** Impact modification of isotactic propylene with EPDM rubber

**Research supervisors:** Prof. Debabrata Chakraborty and Dr. Sumanda Bandyopadhyay (SABIC, Bangalore, India)

**Bachelor of Engineering (B.Tech) - 2009** (1st class; 72.13%)

Department of Polymer Science and Technology

University College of Science, Technology & Agriculture

University of Calcutta, Kolkata, India

**Thesis title:** Preparation of hydrogel polymer for sensor applications

**Research supervisor:** Prof. Priyabrata Sarkar (University of Calcutta)

**Bachelor of Science (B.Sc) – 2006** (1st class; 63.5%)  
New Alipore College, University of Calcutta, **Honors:** Chemistry

## Achievement

- **All India Rank 132** in GATE 2009 (Graduate Aptitude Test in Engineering)
- **Awarded CSIR-RA fellowship 2018**

## Reviewing Services

Reviewer of International Journal of Energy Research, Ionics and Polymer engineering and science

## Dissertations

1. “Investigation on the dispersion extent of multiwalled carbon nanotubes in polypropylene/multiwalled carbon nanotubes composites”, **PhD Thesis, Indian Institute of Technology Bombay**, India, April 2016.
2. “Impact modification of isotactic polypropylene with EPDM rubber”, **Master’s Thesis, University of Calcutta**, June 2011.

## Publications

- **Journal paper**

1. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, Influence of Carbon Nanotube Type and Novel Modification on Dispersion, Melt-rheology and Electrical Conductivity of Polypropylene/Carbon Nanotube Composites, *Polymer Composites*, 42, 236-252, 2021
2. **Joyita Banerjee**, K. Dutta, A short overview on the synthesis, properties and major applications of poly(p-phenylene vinylene), *Chemical Papers*, 2021 doi.org/10.1007/s11696-020-01492-9
3. **Joyita Banerjee**, K. Dutta, Melt-Mixed Carbon Nanotubes/Polymer Nanocomposites, *Polymer Composites*, 40,12, 4473-4488, 2019
4. **Joyita Banerjee**, S. K. Nayek, K. Dutta, An overview on the recent developments in polyaniline-based supercapacitors, *Polymers for Advanced Technology*, 30, 8, 1902-1921, 2019
5. **Joyita Banerjee**, P. Koronaios, B. Morganstein, S. J. Geib, R. M. Enick, J. A. Keith, E. J. Beckman, S. S. Velankar, Liquids That Freeze When Mixed: Cocrystallization and Liquid–Liquid Equilibrium in Polyoxacyclobutane–Water Mixtures, *Macromolecules*, 51, 8, 3176-3183, 2018
6. **Joyita Banerjee**, K. Dutta, Materials for Electrodes of Li-Ion Batteries: Issues Related to Stress Development, *Critical Reviews in Solid State and Materials Sciences*, 42, 3, 218-238, 2017

7. **Joyita Banerjee**, S. Parija, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, Isothermal crystallization kinetics of polypropylene in melt-mixed composites of polypropylene and multi-walled carbon nanotubes, *Polymer Engineering & Science*, 57, 10, 1136-1146, 2017
8. **Joyita Banerjee**, P. Soliya, M. B. Pallavi, P. Mukhopadhyay, S. Bandyopadhyay, D. Chakrabarty, K. Dutta, Impact Modification of Isotactic Polypropylene with Ethylene-Propylene Diene Monomer Rubber, *International Polymer Processing*, 31, 2, 188-197, 2016
9. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, Deagglomeration of multi-walled carbon nanotubes via an organic modifier: structure and mechanism, *Physical Chemistry Chemical Physics*, 17, 38, 25365-25378, 2015

- **Book Chapter**

1. **Joyita Banerjee**, K. Dutta, D. Rana, Carbon nanomaterials in renewable energy production and storage applications, (chapter name) and “Nanostructured functional materials for energy conversion and storage” (book name) Springer Nature publisher, 23, 51-104, 2019
2. **Joyita Banerjee**, K. Dutta, Role of Advanced Materials in Electrochemical Supercapacitors (chapter name), “New Technologies for Electrochemical Applications” (book name), CRC Press (Taylor and Francis), 4, 2020

- **Paper under revision**

1. **Joyita Banerjee**, R. Samajdar, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, Carbon Nanotubes Interaction with Amorphous and Semi-Crystalline Domains of Polypropylene in Melt-mixed Composites: Influence of Multiwall Carbon Nanotubes Agglomerate and their Modifications, *SPE Polymers* (minor revision)

- **Journal paper and book chapter (Under Preparation)**

1. **Joyita Banerjee**, K. Dutta, Current trends on flexible and wearable supercapacitors based on conjugated conducting polymers (Book Chapter)
2. **Joyita Banerjee**, Sri Sivakumar, Praveen Saini, Metal vanadium oxides for supercapacitor and rechargeable battery application
3. **Joyita Banerjee**, Sri Sivakumar, Doped Transition metal oxide-based electrodes for high energy storage devices

## • Conference publications

1. **Joyita Banerjee**, P. Koronaios, B. Morganstein, S. J. Geib, R. M. Enick, J. A. Keith, E. J. Beckman, S. S. Velankar, Liquids That Freeze When Mixed: Co-Crystallization and Liquid-Liquid Equilibrium in Polyoxacyclobutane-Water Mixtures, AIChE, 2018
2. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, “Effect of modifier on the state of dispersion of carbon nanotubes in immiscible polymer blends prepared via masterbatch approach”, 2013, Asian Workshop on Polymer Processing, Goa, India
3. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, “A Comparative study on the state of dispersion of carbon nanotubes in aqueous media: Effect of 'agglomerated' structure”, 2013, Polymer Processing Society, Asia Australasia Conference, Mumbai, India
4. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, “An Investigation on the state of dispersion of various types of carbon nanotubes in polypropylene Matrix”, 2013, 3<sup>rd</sup> Federation of Asian Polymer Societies (FAPS), Polymer Congress and Macro, Indian Institute of Science, Bangalore, India.
5. **Joyita Banerjee**, A. S. Panwar, K. Mukhopadhyay, A. K. Saxena, A. R. Bhattacharyya, “A comprehensive investigation of dispersion of carbon nanotubes in Polypropylene Matrix”, 2012, Society of Plastic Engineers, ANTEC, Mumbai, India.

## Teaching Assistantship

- Polymer Science and Engineering (Undergraduate/graduate level)  
Indian Institute of Technology Bombay, January – April, 2012
- Advanced Composites (Graduate level)  
Indian Institute of Technology Bombay, August – December, 2012, 2013
- FEG-TEM  
Institute teaching assistant  
Indian Institute of Technology Bombay, April 2013 – December 2014

## Other academic appointments

- Guest Researcher at Leibniz Institut für Polymerforschung Dresden e.V., Dresden, Germany, 7th May 2014 – 7th July 2014  
**Supervisor:** Dr. Petra Pötschke  
**Research topic:** “Dispersion of Multiwalled Carbon nanotubes in Polypropylene matrix: An investigation on crystallization and rheological behavior”
- Visiting Research Associate in the Department of Materials Science and Engineering, Carnegie Mellon University, October 2015 – January 2015  
**Research topic:** “Carbon nanotubes and Polymer Composites” – this involved the preparation of carbon nanotubes aerogel using surfactant and aqueous medium leading to porous structure which finds application in various fields of energy and biomedical engineering.

## Industry Experience

- Intern at GE India Technology Centre Pvt. Ltd., JFWTC, Whitefield Road, Bangalore  
August 2010 – August 2011  
This work emphasized on improving the impact strength of isotactic polypropylene at low temperature.
- Intern at DIC India Ltd, Kolkata  
October 2008 – February 2009  
The work involved preparation of UV varnish paint using polyacrylate polymers along with stabilizer, viscosity reducer and colorant.

## Expertise on analytical techniques

- Electrochemical experiments like cyclic voltametry (CV), Galvanostatic charge/discharge (GCD) and Electrochemical impedance spectroscopy (EIS)
- Fabrication of coin cell
- Experience working in glove box and clean room
- Transmission Electron Microscopy (JEM-2100F; Jeol, Japan) - expertise on imaging nanoparticles like Au nanoparticles, nanotubes, graphene, quantum dot, to study the dispersion of nanoparticles in polymer blends etc.
- Expertise on ultra-microtomy for preparing polymer samples for TEM
- NMR (Nuclear Magnetic Resonance) spectroscopy
- Thermal analysis – DSC, TGA
- Mechanical analysis – Tensile testing, Impact testing (Izod/charpy), SEN (Single Edge Notch) test
- Twin screw micro-compounder (Micro 5; DSM Research, The Netherlands)
- Ion chromatography (Dionex 1100CS)
- Dielectric broadband spectroscopy
- Raman Spectroscopy (HR 800 micro-Raman, HORIBA, Jobin Yvon Technology, France), FTIR
- Nano-indentator (TI-900;Hysitron Inc., Minneapolis, USA)
- Rheology (ARES G2; TA Instruments, USA)
- Electrospinning

## Other activities and professional certificates

- Worked as an organizer workshop on Estimation & Removal Of Arsenic at University College of Science and Technology, University of Calcutta (2009)
- Worked as an organizer Symposium of Research Scholar, national seminar held at Department of Metallurgical Engineering and Materials Science, IIT Bombay (2013)
- Attended workshop on Fundamentals of IPR (2012) and on advanced course of searching and drafting Patents – Certified.

## References

### **Prof. Sachin Velankar**

Professor

Department of Chemical and Petroleum Engineering

University of Pittsburgh

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### **Prof. Amartya Mukhopadhyay**

Associate Professor

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IIT Bombay

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