Jolly Bhadra

Curriculum Vitae

"Patience follows hard-work"

Professional Experience

Qatar University, Doha, Qatar. July 2014 - Present

Presently, I am serving as a Research Assistant in Centre of Advanced Materials (CAM) of Qatar University. My expertise lies mostly in conducting polymer (CP) domains such as fabrication and characterization of CP sensors.

Post Doctoral Experience

Qatar University, Doha, Qatar. November 2011 - June 2014

I have also been associated with Centre of Advanced Materials (CAM) of Qatar University (QU) as a Post-doctoral researcher. During this period, I have been involved in various QU projects such as Al-Bairaq and QNRF sponsored scientific projects of the Center.

Indian Institute of Science Bangalore, Bangalore, India. November 2009 - May 2010

I have served as a Research Associate in the Department of Aerospace Engineering, IISc Bangalore, under the supervision of Dr. D. Roy Mahapatra. The theme of this project dealt with bio-degradable polymer-hydrogel for medical applications.

Education

Gauhati University, Guwahati, India. December 2005 - November 2009

Ph.D. in Polymer Physics.

- Research work: Investigation of the Electrical and Optical properties of some conducting polymer blends. In my work, I have synthesized Polyaniline and Polypyrrole Blend in Polyvinyl alcohol matrix by dispersion polymerization method and interfacial polymerization method. The films obtained are characterized by different techniques, such as FTIR, XRD, FESEM, IV characteristics, four probe conductivity & temperature dependent conductivity and then used for preparation of field effect transistors on different substrates.

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Dibrugarh University, Dibrugarh, India. July 2002 - June 2003

MSc (Electronics), Main Subjects Covered (Physics, Electronics), Marks secured - 63 per.
Awarded the best set up prize for outstanding workshop in electronics (2003).

Lakhimpur Girls' College, Dibrugarh University, India. July 2000 - June 2001

BSc (Physics), Main Subjects Covered (Mathematics, Physics, Electronics), Marks secured - 57 per.
Awarded the BJ trust prize for outstanding performance in Physics (2001).

North Lakhimpur College, Lakhimpur, Assam. 1997 - 1998

Marks secured - 58 per.

JFCHE High School, Lakhimpur, Assam. 1995 - 1997

Marks secured - 64 per.

Journal Publications

- **Jolly Bhadra**, N. J. Al-Thani, N. K. Madi, M. A. Al-Maadeed, "Effects of aniline concentrations on the electrical and mechanical properties of polyaniline polyvinyl alcohol blends", Arabian Journal of Chemistry, 2015. http://dx.doi.org/10.1016/j.arabjc.2015.04.017

- Jobin Jose, Mamdouh A. Al-Harthi, Mariam Al-Ali Al-Maadeed, **Jolly Bhadra**, Sadhan K. De, "Effect of graphene loading on thermo-mechanical properties of poly(vinyl alcohol)/starch blend", Journal of Applied Polymer Science. 2015. DOI: 10.1002/APP.41827

- Jobin Jose, S. K De, Mariam Al-Ali Al-Maadeed, **Jolly Bhadra**, P. A Sreekumar, Rachid Sougrat and Mamdouh A. Al-Harthi, "Compatibilizing role of carbon nanotubes in poly(vinyl alcohol)/starch blend", Starch/Strke, Vol. 66, pp. 1-7, 2014. DOI 10.1002/star.201400074

- **Jolly. Bhadra**, N. K. Madi, N. J. Al-Thani, and Mariam A. Al-Maadeed, "Polyaniline/polyvinyl alcohol blends: Effect of sulfonic acid dopants on microstructural, optical, thermal and electrical properties", Synthetic Metals, Elsevier, 2014, $http://dx.doi.org/10.1016/j.synthmet.2014.03.003$. (Article in press)

- **Jolly Bhadra**, N. J. Al-Thani, N. K. Madi, and Mariam A. Al-Maadeed, "Preparation and characterization of chemically synthesized polyaniline - polystyrene blends as a carbon dioxide gas sensor", Synthetic Metals, Elsevier, Vol. 181, No. 1, pp. 27-36, 2013.

- **Jolly Bhadra** and Deepali Sarkar, "Nanometer sized particles of polyanilines from dispersion polymerization in polyvinyl alcohol matrix", Bulletin of Materials Science, Springer, Vol. 33, No. 5, pp. 1-5, 2010.

- **Jolly Bhadra** and Deepali Sarkar, "Synthesis of polypyrrole-polyvinyl alcohol blends by interfacial method", Indian Journal of Physics, Springer, Vol. 84, No. 10, pp. 1317-1321, 2010.

- **Jolly Bhadra** and Deepali Sarkar, "Field effect transistor fabricated from polyaniline- polyvinyl alcohol nanocomposite", Indian Journal of Physics, Springer, Vol. 84, No. 6, pp. 693-697, 2010.

- **Jolly Bhadra** and Deepali Sarkar, "Electrical and optical properties of polyaniline polyvinyl alcohol composite film ", Indian Journal of Pure and Applied Physics, Vol. 48, pp. 425-428, 2010.

- **Jolly Bhadra** and Deepali Sarkar, "Self-assembled polyaniline nanorods synthesized from a facile route of dispersion polymerization", Material Letters, Elsevier, Vol. 63, pp. 69-71, 2009. (**41 citations**)

- **Jolly Bhadra** and Deepali Sarkar, "Field effect transistor from dispersion polymerization aniline", Indian Journal Of Physics, Springer, Vol. 82, No. 6, pp. 795-799, 2008.

- **Jolly Bhadra** and Deepali Sarkar, "Poly-(o-ethoxy)-aniline, a processable polyaniline: effect of protonation", Asian Journal of Physics, Vol. 17, No. 1, pp. 69-72, 2008.

Conference Publications

- **Jolly Bhadra**, N. K. Madi, N. J. Al-Thani, and Mariam A. Al-Maadeed, "Room temperature ammonia gas sensor based on different acids doped polyanilinepolyvinyl alcohol blends," Qatar Foundation Annual Research Forum, October 22-24, 2012.

- **Jolly Bhadra**, N. K. Madi, N. J. Al-Thani, and Mariam A. Al-Maadeed, "Application of chemically synthesized polyaniline - polystyrene blend as a carbon dioxide gas sensor," Qatar Foundation Annual Research Forum, October 22-24, 2012.

- **Jolly Bhadra**, P. Nampoothiri, Kamlesh J Suthar, D. Roy Mahapatra, "Effect of Core-Shell Structure of Hydrogel Beads on the Threshold Concentration of Water for Swelling and Its pH Sensitivity", ASME 2010 International Mechanical Engineering Congress and Exposition IMECE 2010, by Vancouver Convention and Exposition Center,Vancouver, British Columbia, Canada, November 12-18, 2010.

- **Jolly Bhadra**, P. Nampoothiri, D. Roy Mahapatra, "Electronic Transport Properties of Alginate based Hydrogel under various pH Conditions for Sensing Applications", In International Conference on Nanomaterials and Nanotechnology (NANO 2010) by Center for Nanoscience and Technology , K. S. Rangasamy College of Technology, Tiruchengode Namakkal, December 13-16, 2010.

- P. Nampoothiri, **J. Bhadra**, D. Roy Mahapatra, G.M. Hegde, B.N. Shivananju, S. Asokan, S. Bandyopadhyay and P. Biswas, "Sensing CaCl2 Binding and pH Induced Strain Relaxation by Hydrogel Coated FBG Sensor", In International Conference on Nanomaterials and Nanotechnol-

ogy (NANO 2010) by Center for Nanoscience and Technology , K. S. Rangasamy College of Technology, Tiruchengode Namakkal, December 13-16, 2010.

- **Jolly Bhadra**, K. Boruah and Deepali Sarkar, "All Polymer FET Fabricated from Polypyrrole-Polyvinyl Alcohol (PPy-PVA) Nanocomposite", In International Conference on Advanced Nanomaterials and Nanotechnology" by Center for Nanotechnology, IIT Guwahati, December 9-11, 2009.

- **Jolly Bhadra** and Deepali Sarkar, "Characterization and Conductivity study of Polypyrrole Nanorod Synthesized by Interfacial Method in Polyvinyl Alcohol Matrix", In International Symposium for Research scholars on Metallurgy and Materials Science and engineering conducted by Department of Metallurgy and Material Engineering, IIT Madras, December 10-12, 2008.

- **Jolly Bhadra** and Deepali Sarkar, "Field Effect Transistor Fabricated from Polyaniline- Polyvinyl Alcohol Nanocomposite", In VIth Conference of Physics Academy of North East April 3-4, 2009, Department of Physics Tripura University, Agartala, Tripura. India.

- **Jolly Bhadra** and Deepali Sarkar, "Synthesis of Polypyrrole-Polyvinyl Alcohol Blends by Interfacial Method", In CMDAY'S 2008, August 29-31st 2008, Department of Physics, Visva-Bharati Santinikatan, Bolpur, West Bengal,India.

- **Jolly Bhadra** and Deepali Sarkar, "Polyaniline Nanorod preparation by simple dispersion polymerization", In 52nd DAE SSPS 2007, December 27th-31st 2007, Department of Studies in Physics, University of Mysore, Manasagangotri, Mysore - 570006, India.

- **Jolly Bhadra** and Deepali Sarkar, "Nanometer sized particles of Polyaniline From Dispersion Polymerization in Polyvinyl alcohol Matrix", In International Conference on Materials of the Millennium, March 1-3, 2007 Department of Applied Chemistry, Cochin University of Science and Technology, Kochin, India.

- **Jolly Bhadra** and Deepali Sarkar, "Dispersion Polymerized Aniline: Field Effect Transistor behaviour and Characterization", In Vth Conference of Physics academy of North East, March 1-3, 2007, Department of Physics, Gauhati University, Guwahati, Assam, India.

- **Jolly Bhadra** and Deepali Sarkar, "Polyaniline-Polyvinyl alcohol nano all plastic Field Effect Transistor", In International Conference of Laser and Nanomaterials, November 30-December 2, 2006, Department of Physics, University of Calcutta, Kolkata, India .

- **Jolly Bhadra** and Deepali Sarkar, "Electrical and optical properties of Polyaniline Polyvinyl alcohol composite film", In National Conference on Novel Materials and Technologies, February 17-18 2006, Department of Physics, Sri Venkateswara University, Tirupati, India.

Workshop Attended

- "Condensed Matter Interface with Chemistry and Biology", Mumbai, Organized by BARC from 3rd -14th March 2008.

- "National Workshop on Recent Trends in Polymer Science", IASST, Guwahati, from 20th -25th of October 2008.

- "Computational Statistical Physics", IIT Guwahati, Organized by SERC from 1st -21st of December 2008.

Computing Skills

Scripting Languages: Unix Shell Scripting
Markup Languages: HTML, LaTeX, and some TeX.
Operating Systems: Linux (Ubuntu and Red Hat), Windows
Software applications:

Office - Microsoft Office

Scientific - Origin and Matlab

Professional Affiliations:

- Student member of IEEE.
- Awarded "Research Fellowship in Science for Meritorious Student" by University Grant Commission, India.
- Awarded the first prize in Al-Bairaq IMA Researcher (sixth cycle), 2013.

Non Academic Awards:

1st prize in quiz competition for three consecutive years conducted by RRI, Jaipur.

1st prize in Essay competition conducted by Vivekananda Mission.

Voluntary Work

Assistant youth leader at "Dibrugarh University, Guwahati University" (2000, 2003, 2008).

A member of the University "Community Action" group.(2008).

Abstract of Research Experience at Qatar University

Conducting polymers and their derivatives are used as active layers of gas sensors since many decades. The sensors made of conducting polymers have many improved characteristics, such as high sensitivity, short response time, good mechanical properties allowing facile fabrication of sensors, and easy to be synthesized through chemical or electrochemical processes. As a result, more and more attentions have been paid to the sensors fabricated from conducting polymers. In my current work, first an attempt has been made to increase the processability of the conducting polymer through chemical blending and then its electrical properties have been tuned to obtain proper sensitivity to specific gases. This investigation has lead us to obtain a conducting polymer freestanding film with promising mechanical strength. Furthermore, it has been observed that these freestanding films are highly sensible to carbon dioxide and acetone. The effect of dopant concentration on the electrical properties of the blends are under investigation.

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Abstract of Postdoctoral Experience at IISc Bangalore

Certain pH sensitive Hydrogels show a strong swelling ability in the presence of certain pH level in the solvent. Physical factors like temperature, electric field, pH, concentration of organic compounds in water, and salt concentration make them promising materials for a broad range of sensing and bio-molecular transport applications. Due to the dissociation of the functional acidic or basic groups at the polymer back-bone and the influx of counter ions to the beads at initial (dry) state, the concentration of ions in the hydrogel is higher than in the surrounding solution. This causes a difference in osmotic pressure and results in a solution flux into the hydrogel and hence swelling. The interaction and repulsion of charges along the polymer chain also lead to an increased swelling. In the due course of research, a mathematical modelling of the swelling process is simulated in Comsol multiphysics package by considering Nernst-Planck equation. Donnan's theory is then used to calculate the concentration of the other ions. The deformation of the hydrogels is calculated by using the momentum balance equation including viscous dissipation and phase transformation in the polymeric gel. Attempt is made to predict the experimentally observed phenomena using numerical simulations.

Referees

Ph. D. Thesis Supervisor	Postdoc. Supervisor	Postdoc. Supervisor
Dr. Deepali Sarkar	Dr. D. Roy Mahapatra	Dr. Noora. Al-Thani
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