




## Faculty Details proforma for DU Web-site

Title	Prof.	First Name	Parbati	Last Name	Biswas	Photograph
Designation		Professor				
Address		Department of Chemistry University of Delhi, Delhi, India				
Phone No Office		011-27666646 (203)				
Residence		A4-202, Kingsbury, T.D.I. City, Kundli, Haryana.				
Mobile						
Email		<a href="mailto:pbiswas@chemistry.du.ac.in">pbiswas@chemistry.du.ac.in</a>				
Web-Page						
<b>Educational Qualifications</b>						
Degree		Institution			Year	
Ph.D.		Indian Institute of Science, Bangalore			1996	
M.Phil. / M.Tech.						
PG		Univ. of Calcutta, Calcutta			1989	
UG		St. Xavier's College, Univ. of Calcutta, Calcutta			1987	
Any other qualification						
<b>Career Profile</b>						
<ol style="list-style-type: none"> <li>1. Univ. of Delhi, Dept. of Chemistry, 2005-present.</li> <li>2. Rensselaer Polytechnic Institute, New York, U. S. A. Postdoctoral Research Associate, 2003-2004.</li> <li>3. University of Pennsylvania, Philadelphia, U. S. A. Postdoctoral Fellow. 2001-2003.</li> <li>4. Universität Freiburg, Germany, Humboldt Fellow, 1998-2000.</li> <li>5. University of Leeds, U. K. EPSRC Fellow, 1997-1998.</li> </ol>						
<b>Administrative Assignments</b>						
Convener, Physical Chemistry (2007-2008), Member of various committee, DRC, Syllabus and Course Revision Committee etc.						

<b>Areas of Interest / Specialization</b>
<p><b>Statistical Mechanics of Polymers and Biopolymers: Theory and Simulation</b></p> <p><b>Soft Condensed Matter</b></p>
<b>Subjects Taught</b>
<p><b>M. Sc. Courses:</b></p> <ol style="list-style-type: none"> <li><b>1. Statistical Mechanics (Core Course)</b></li> <li><b>2. Irreversible Thermodynamics and Nonequilibrium Statistical Mechanics</b></li> <li><b>3. Advanced Statistical Mechanics</b></li> </ol> <p><b>M. Phil./Ph. D. Courses:</b></p> <ol style="list-style-type: none"> <li><b>1. Statistical Mechanics of Complex Systems</b></li> <li><b>2. Soft Condensed Matter</b></li> </ol>
<b>Research Guidance</b>
<p>List against each head (If applicable)</p> <p><b>Ph. D. Students:</b></p> <ol style="list-style-type: none"> <li><b>1. Gobind Ji Rai (CSIR-SRF, 2012-present): Dynamics of Branched Polymers in Hydrodynamic Flow Fields.</b></li> <li><b>2. Adesh Kumar (CSIR-JRF, 2013-present): Quantifying Various Interactions in Protein Folding and Misfolding.</b></li> <li><b>3. Shivangi Sharma (UGC-JRF, 2013-present): Stochastic Processes in Networks.</b></li> <li><b>4. Vishal Singh (CSIR-JRF, 2014-present): Dynamics in the energy landscape of proteins.</b></li> <li><b>5. Shilpa Gupta (UGC-JRF, 2015-present): Conformational Characterization of Macromolecules by Molecular Dynamics Simulation.</b></li> <li><b>6. Leena Aggarwal (CSIR-JRF, 2016-present): Statistical Theory of Mapping Local Water Densities around Biomolecules.</b></li> </ol> <p><b>Thesis Submitted:</b></p> <ol style="list-style-type: none"> <li><b>1. Pooja Rani (DST-SRF, 2010-present): <i>IN-SILICO</i> Study of Globular and Disordered</b></li> </ol>

### **Proteins through Sequence Analysis and Hydration Properties.**

#### **Former Ph. D. Students:**

- 1. Dr. Anupaul Baruah (2009-2015): A generalized approach to investigate various folding phenomena and intrinsic disorder in proteins by sequence design and mutation.**
- 2. Dr. Amit Kumar (2008-2013): A Generalized Theoretical Model to Evaluate the Conformational and Dynamic Properties of Semiflexible Dendrimers.**
- 3. Dr. Nidhi Rawat (2007-2012): Statistical Analysis of the Physico-chemical Properties of Proteins, Nucleic Acids and Their Complexes.**
- 4. Dr. Nicholus Bhattacharjee (2006-2011): Statistical Analysis and Molecular Dynamics Simulations of Protein Secondary Structures.**
- 5. Dr. Arnab Bhattacharjee (2006-2010): Statistical Theory of Designing Evolutionary Fit Protein Sequences.**
- 6. Dr. Snehlata (2006-2009): Designing, Synthesis and Biological Screening of Peptidomimetics as ACE Inhibitors. (Co-advised with Dr. Santosh Pasha, I.G.I.B)**

#### **M. Phil. Student:**

**L. Saya Devi (2006-2007).**

#### **Publications Profile**

- 1. G. J. Rai, A. Kumar and P. Biswas, 2016, Dynamics of Dendrimers with Excluded Volume: A Comparison with Experiments and Simulations, J. Rheol., 60, 111 (5-year Impact Factor: 2.819)**
- 2. P. Rani and P. Biswas, 2015, Diffusion of Hydration Water around Intrinsically**

- Disordered Proteins, *J. Phys. Chem. B*, 119, 13262 (5-year Impact Factor: 3.528)
3. A. Baruah, P. Rani and P. Biswas, 2015, Conformational entropy of intrinsically disordered proteins from amino acid triads, *Sci. Rep.*, 5, 11740 (5-year Impact Factor: 5.228)
  4. A. Baruah and P. Biswas, 2015, Designing pH induced fold switch in proteins, *J. Chem. Phys.*, 142, 185102 (5-year Impact Factor: 2.95)
  5. G. J. Rai, A. Kumar and P. Biswas, 2015, Effect of excluded volume on the rheology and transport dynamics of randomly hyperbranched polymers, *J. Chem. Phys.*, 142, 174906 (5-year Impact Factor: 2.95)
  6. P. Rani and P. Biswas, 2015, Local structure and dynamics of hydration water in intrinsically disordered proteins, *J. Phys. Chem. B*, 119, 10858 (5-year Impact Factor: 3.528)
  7. P. Rani, A. Baruah and P. Biswas, 2014, Does lack of secondary structure imply intrinsic disorder in proteins? A sequence analysis, *BBA-Proteins Proteom*, 1844, 1827 (5-year Impact Factor: 3.280)
  8. G. J. Rai, A. Kumar and P. Biswas, 2014, Intramolecular relaxation of flexible dendrimers with excluded volume, *J. Chem. Phys.*, 141, 34902 (5-year Impact Factor: 2.95)
  9. P. Rani and P. Biswas, 2014, Shape dependence of the radial distribution function of hydration water around proteins, *J. Phys.: Condens. Matter.*, 26, 335102 (5-year Impact Factor: 2.507)
  10. A. Baruah and P. Biswas, 2014, The role of site-directed point mutations in protein misfolding, *Phys. Chem. Chem. Phys.*, 16, 13964. (5-year Impact Factor : 4.219)

11. N. Rawat and P. Biswas, 2014, Hydrogen bond dynamics in intrinsically disordered proteins, *J. Phys. Chem. B*, 118, 3018. (5-year Impact Factor: 3.528)
12. A. Baruah and P. Biswas, 2014, Designing sequences with varied flexibility and stability through pair mutations, *RSC Adv.*, 4, 8031. (5-year Impact Factor : 3.907)
13. A. Kumar and P. Biswas, 2013, Orientational relaxation in semiflexible dendrimers, *Phys. Chem. Chem. Phys.*, 15, 20294. (5-year Impact Factor : 4.219)
14. N. Bhattacharjee and P. Biswas, 2013, Helical ambivalency induced by point mutations, *BMC Struct. Biol.*, 13, 9. (5-year Impact Factor : 2.096)
15. A. Kumar, G. J. Rai and P. Biswas, 2013, Conformation and intramolecular relaxation dynamics of semiflexible randomly hyperbranched polymers, *J. Chem. Phys.*, 138, 104902. (5-year Impact Factor : 2.95)
16. N. Bhattacharjee, P. Rani and P. Biswas, 2013, Capturing molten globule state of  $\alpha$ -lactalbumin through constant pH molecular dynamics simulations, *J. Chem. Phys.*, 138, 095101. (5-year Impact Factor : 2.95)
17. A. Kumar and P. Biswas, 2013, Semiflexibility induced range of conformations in dendrimers, *Soft Matter (Communication)*, 9, 2375. (5-year Impact Factor : 4.289)
18. S. Chaudhary, M. K. Seth, I. D. Vats, K. Kumar, P. Biswas, J. Karar, M. E. Hussain, M. A. Q. Pasha and S. Pasha, 2013, Sulphur containing angiotensin converting enzyme inhibitor-3-thienylalanine-orinthyl-proline activates endothelial function and expression of genes involved in renin angiotensin system, *J. Cardiovasc. Pharm.*, 61, 311. (5-year Impact Factor: 2.243)
19. A. Kumar and P. Biswas, 2012, Conformational transitions in semiflexible dendrimers induced by bond orientations, *J. Chem. Phys.*, 137, 124903. (5-year Impact Factor :

2.95)

20. N. Rawat and P. Biswas, 2012, Hydrophobic moments, shape, and packing in disordered proteins, *J. Phys. Chem. B*, 116, 6326. (5-year Impact Factor : 3.528)
21. A. Baruah, A. Bhattacharjee and P. Biswas, 2012, Role of conformational heterogeneity on protein misfolding, *Soft Matter*, 8, 4432. (5-year Impact Factor : 4.289)
22. N. Bhattacharjee and P. Biswas, 2012, Are ambivalent  $\alpha$ -helices entropically driven? *PEDS*, 25, 73. (5-year Impact Factor : 2.604)
23. N. Bhattacharjee and P. Biswas, 2011, Local order and mobility of water molecules, *J. Phys. Chem. B*, 115, 12257. (5-year Impact Factor : 3.528)
24. N. Bhattacharjee and P. Biswas, 2011, Structure of hydration water in proteins: A comparison of molecular dynamics simulations and database analysis, *Biophys. Chem.*, 158, 73. (5-year Impact Factor : 2.002)
25. A. Kumar and P. Biswas, 2011, Intramolecular relaxation dynamics in semiflexible dendrimers, *J. Chem. Phys.*, 134, 214901. (5-year Impact Factor : 2.95)
26. N. Rawat and P. Biswas, 2011, Shape, flexibility and packing of proteins and nucleic acids in complexes, *Phys. Chem. Chem. Phys.*, 13, 9632. (5-year Impact Factor : 4.219)
27. P. Biswas and A. Bhattacharjee, 2011, Role of foldability and stability in designing real protein sequences, *Phys. Chem. Chem. Phys.*, 13, 9223. (5-year Impact Factor : 4.219)
28. A. Bhattacharjee and P. Biswas, 2011, Designing misfolded sequences by energy landscaping, *J. Phys. Chem. B*, 115, 113. (5-year Impact Factor : 3.528)
29. N. Bhattacharjee and P. Biswas, 2010, Statistical analysis and molecular dynamics simulations of ambivalent  $\alpha$ -helices, *BMC Bioinformatics*, 11, 519. (5-year Impact

Factor : 3.452)

30. N. Bhattacharjee and P. Biswas,, 2010, Position-specific propensities of amino acids in the  $\beta$ -strand, *BMC Struct. Biol.*, 10, 29. (5-year Impact Factor : 2.096)
31. A. Kumar and P. Biswas, 2010, Dynamics of semiflexible dendrimers in dilute solutions, *Macromolecules*, 43, 7378. (5-year Impact Factor : 5.654)
32. A. Bhattacharjee and P. Biswas, 2010, Neutrality and evolvability of designed protein sequences, *Phys. Rev. E*, 82, 011906. (5-year Impact Factor : 2.233)
33. A. Bhattacharjee and P. Biswas, 2009, Statistical theory of protein sequence designs by random mutation, *J. Phys. Chem. B*, 113, 5520. (5-year Impact Factor : 3.528)
34. A. Bhattacharjee and P. Biswas, 2009, Combinatorial design of protein sequences with applications to real and lattice proteins, *J. Chem. Phys.*, 131, 125101. (5-year Impact Factor : 2.95)
35. N. Bhattacharjee and P. Biswas, 2009, Structural patterns in  $\alpha$ -Helices and  $\beta$ -Sheets in globular proteins, *Protein Pept. Lett.*, 16, 953. (5-year Impact Factor : 1.104)
36. N. Rawat and P. Biswas, 2009, Size, shape and flexibility of proteins and DNA, *J. Chem. Phys.*, 131, 165104. (5-year Impact Factor : 2.95)
37. A. Bhattacharjee and P. Biswas, 2009, Statistical theory of neutral protein evolution by random site mutations, *J. Chem. Sci.*, 121, 887. (5-year Impact Factor : 1.421)
38. Snehlata, I. D. Vats, M. Chopra, P. Biswas and S. Pasha, 2009, Effect of varying chain length between P1 and P1' position of of tripeptidomimics on activity of angiotensin converting enzyme inhibitors, *Bioorg. Med. Chem. Lett.* 19, 4364. (5-year Impact Factor : 2.303)

39. K. Hanif, Snehalata, M.C. Pavar, E. Arif, P. Biswas, M. Fahim, M. A. Pasha and S. Pasha, 2009, Effect of 3-thienylamine-ornithine-proline, new Sulphur-containing angiotensin-converting enzyme inhibition on blood pressure and oxide stress in spontaneously hypertensive rats, *J. Cardiovasc. Pharm.* 53, 145. (5-year Impact Factor : 2.243)
40. S. Mukherjee, A. Saha, P. Biswas, C. Mandal and K. Ray, 2008, Structural analysis protein variants of factor IX to predict functional aberration haemophilia B, *Haemophilia*, 14, 1076. (5-year Impact Factor: 2.584)
41. A. Sharma, S. Chavali, A. Mahajan, P. Biswas and D. Bharadwaj, 2008, Multiple substitution at single site: interpreting the effect of Asn92 mutations in human coagulation factor IX, *Haemophilia*, 14, 396. (5-year Impact Factor: 2.584)
42. M. Vidyasagar et. Al, 2007, Biosuite: A comprehensive bioinformatics software package (a unique industry-academia collaboration), *Current Sci.*, 92, 29. (5-year Impact Factor: 0.944)
43. P. Biswas, J. Zou and J. G. Saven, 2005, Statistical theory for protein ensembles with designed energy landscapes, *J. Chem. Phys.*, 123, 154908. (5-year Impact Factor: 2.95)
44. P. Biswas, R. Kant and A. Blumen, 2001, Stretch dynamics of flexible dendritic polymers in solution, *J. Chem. Phys.*, 114, 2430. (5-year Impact Factor: 2.95)
45. P. Biswas, R. Kant and A. Blumen, 2000, Polymer dynamics and topology: Extension of stars and dendrimers in external fields, *Macromol. Theory Simul.*, 9, 56. (5-year Impact Factor: 1.559)
46. R. Kant, P. Biswas and A. Blumen, 2000, Hydrodynamic effects on the extension of stars and dendrimers in external fields, *Macromol. Theory Simul.*, 9, 608. (5-year Impact Factor: 1.559)



47. T. C. B. McLeish et. al, 1999, Dynamics of entangled H-polymers: Theory, rheology and neutron-scattering, *Macromolecules*, 32, 6734. (5-year Impact Factor: 5.654)
48. P. Biswas, A. Paramekanti and B. J. Cherayil, 1996, Shapes of generalized random walks, *J. Chem. Phys.*, 104, 3360. (5-year Impact Factor: 2.95)
49. P. Biswas, A. Paramekanti and B. J. Cherayil, 1995, Polymers below the theta point: Renormalization group considerations, *J. Chem. Phys.*, 103, 7562. (5-year Impact Factor: 2.95)
50. P. Biswas and B. J. Cherayil, 1995, Dynamics of fractional brownian walks, *J. Phys. Chem.*, 99, 816. (5-year Impact Factor: 3.528)
51. P. Biswas and B. J. Cherayil, 1994, Radial dimensions of starburst polymers, *J. Chem. Phys.*, 100, 3201. (5-year Impact Factor: 2.95)
52. P. Biswas and B. J. Cherayil, 1994, Chain dimensions near the critical point, *J. Chem. Phys.*, 100, 4665. (5-year Impact Factor: 2.95)
53. B. J. Cherayil and P. Biswas, 1993, Path integral description of polymers using fractional Brownian walks, *J. Chem. Phys.*, 99, 9230. (5-year Impact Factor: 2.95)

#### Conference Organization/ Presentations (in the last three years)

1. Organization of a Conference:

Organized a Satellite Workshop on "Advances in Molecular Dynamics of Biomolecules" in SC&IS Jawaharlal Nehru University, New Delhi, December 3-4, 2013.

Source of Funding: Department of Biotechnology, Govt. of India Department of Electronics & Information Technology, Govt. of India.

## **2. Participation as Paper/Poster Presenter:**

### **Poster presentations:**

- 1. G. J. Rai and P. Biswas, "Dynamics of Dedrimers with Excluded Volume: A Comparison with Experiments and Simulations" presented at DU-JAIST Indo-Japan Symposium on Chemistry of Functional Molecules/Materials, University of Delhi, Delhi, 2016.**
- 2. S. Sharma and P. Biswas, "Effect of Colored Noise on Unbiased Chain Translocation Dynamics" presented at DU-JAIST Indo-Japan Symposium on Chemistry of Functional Molecules/Materials, University of Delhi, Delhi, 2016.**
- 3. A. Kumar, A. Baruah and P. Biswas, "The Role of Local and Nonlocal Interactions in Protein Folding/Misfolding" presented at Symposium on Accelerating Biology 2016: Decoding the Deluge, CDAC, Pune, 2016.**
- 4. P. Rani and P. Biswas, "Local Structure and Dynamics of Hydration Water around Intrinsically Disordered Proteins" presented at Symposium on Accelerating Biology 2016: Decoding the Deluge, CDAC, Pune, 2016.**
- 5. P. Rani and P. Biswas, "Shape Dependence of the Radial Distribution Function of Hydration Water around Proteins" presented at National Conference on Interdisciplinary Approaches in Chemical Sciences, Jamia Millia Islamia, Delhi, 2015.**
- 6. G. J. Rai and P. Biswas, "Dynamics of Dendritic Poilymers with Excluded Volume" presented at National Conference on Interdisciplinary Approaches in Chemical Sciences, Jamia Millia Islamia, Delhi, 2015.**
- 7. A. Baruah and P. Biswas, "The role of mutations and structural flexibility in protein misfolding" presented in CDAC, Pune, 2015.**
- 8. A. Baruah and P. Biswas, "The role of mutations and structural flexibility in protein**

- misfolding” presented at T.C.S., NCL, Pune, 2014.
9. G. J. Rai and P. Biswas, “Intramolecular relaxation of flexible dendrimers with excluded volume” presented at T.C.S., NCL, Pune, 2014.
  10. A. Kumar and P. Biswas, “Conformation and intramolecular relaxation dynamics of semiflexible randomly hyperbranched polymers” presented at 50<sup>th</sup> Annual Convention of Chemists 2013, Panjab University, Chandigarh, December, 2013.
  11. P. Rani and P. Biswas, “Capturing molten globule state of  $\alpha$ -lactalbumin through constant pH molecular dynamics simulations” presented at ICBSD, I. I. T. Madras, Chennai, November, 2013.
  12. P. Rani and P. Biswas, “Conformational entropy of intrinsic disordered proteins” presented at T. C. S., I. I. T. Guwahati, Assam, 2012.
  13. A. Baruah and P. Biswas, “How does conformational heterogeneity affect protein folding?” presented at T. C. S., I. I. T. Guwahati, Assam, 2012.
  14. A. Kumar and P. Biswas, “Role of bond orientation in semiflexible dendrimers” presented at I. S. M., B. A. R. C. Mumbai, 2012.
  15. A. Baruah and P. Biswas, “Affect of native state fluctuation on protein misfolding” presented at I-ISC, J. M. I. Delhi, 2012.
  16. N. Rawat and P. Biswas, “Hydrophobic moments, shape and packing of disordered proteins” presented at I-ISC, J. M. I. Delhi, 2012.
  17. N. Bhattacharjee and P. Biswas, “Structure and Mobility of Water Molecules around Ambivalent Helices” presented at J. N. U. Delhi, 2011.

**Research Projects (Major Grants/Research Collaboration)**

- 1. Principal Investigator in the DST (SERC) project titled “Statistical theory of optimized potentials for folding proteins” (Project No.-SR/S1/PC-07/2006)**
- 2. Principal Investigator in the DST (SERB) project titled “Role of non-local interactions on the fold-misfold transition of proteins” (Project No.-SB/S1/PC-023/2013)**

#### **Awards and Distinctions**

- 1. Alexander von Humboldt Fellowship (Germany)**
- 2. EPSRC fellowship (U.K.)**

#### **Association With Professional Bodies**

#### **Other Activities**

##### **Invited Talk/Oral Presentation:**

- 1. “Conformation and dynamics of branched polymers with semiflexibility and excluded volume” presented at Compflu-2016, IISER-Pune, January 2016.**
- 2. “A generalized model for the dynamics of dendritic polymers with excluded volume interactions” presented at conference on Physical and Biophysical Chemistry: Theory and Experiment, IIT Bombay, December 2015.**
- 3. “A generalized approach to understand intrinsically disordered proteins” presented at IISER Mohali, August 2015.**
- 4. “Intramolecular relaxation of dendrimers with semiflexibility & excluded volume” presented at INST Mohali, August 2014.**
- 5. “Conformational dynamics of ambivalent helices” Presented at Accelerating Biology 2014 Computing Life, YASHADA, Pune, February 2014.**

6. **“Role of site directed point mutations in misfolding proteins”** Presented at International Conference on Biomolecular Simulations & Dynamics: Recent Advances & Future Perspectives. I. I. T. Madras, Chennai, November 2013.
7. **“How do proteins misfold?”** Presented at International conference on Interdisciplinary Areas with Chemical Sciences. Panjab University, Chandigarh, October 2013.
8. **“Sequence and conformational heterogeneity in misfolding proteins”** Presented at Current Trend in Biochemical and Biophysical Modelling. S. N. Bose Research Institute, Kolkata, October 2013.
9. **“Sequence and conformational heterogeneity in misfolding proteins”** Presented at Biomolecules in Motion: Theory and Simulations. J. N. U, Delhi, January 2013.
10. **“Conformational and dynamical properties of semiflexible dendrimers”** Presented at 11<sup>th</sup> Theoretical Chemistry Symposium, I. I. T. Guwahati, Assam, December 2012.
11. **“Conformation, entropy and hydration pattern of ambivalent helices”** Presented at National Conference on New Trends in Bioinformatics. I. I. T. Delhi, July 2012.
12. **“How do proteins misfold?”** Presented at Biomolecular Simulation: Algorithm and Application. J. N. U. Delhi, March 2011.