Dr. Amar Nath GUPTA

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Research Interest

I am interested in doing research in the field of single molecule Biophysics and soft matter Physics. How biological molecules fold (and unfold) is a question of immense importance in both the physical sciences and life sciences. The single-molecule experiments offer several advantages over conventional ensemble methods through the removal of ensemble averaging. By conducting many sequential measurements the distributions and fluctuation of molecular properties can be characterized, transient intermediates can be revealed. Single-molecule trajectories provide dynamic and statistical information that is often hidden in ensemble-averaged results and also permit real-time observation of rarely populated transients, which is difficult or impossible to capture using conventional methods.
Free-energy landscape formalisms provide the fundamental conceptual framework for understanding of the biophysics of folding: in principle, the microscopic rates, diffusion constant at different point of the landscape and pathways for folding of protein. Theoretical studies suggest that single-molecule experiments, performed at different temperatures, might allow exploration of the roughness of protein-folding energy landscapes. It would be nice to explore this aspect from the energy landscape profile. I am always kin to learn new techniques to explore more in the field of Biophysics to improve our understanding of living world.

Education

- **PhD** (2008) from School of Physical Sciences, Jawaharlal Nehru University, New Delhi, India

  Thesis Title: *Kinetics of Phase Transitions in Aqueous Polyelectrolytes and Gels*
  Supervisor: Prof. Himadri B. Bohidar

- **Pre-PhD** (2003-2004) School of Physical Sciences, JNU, New Delhi, India; **CGPA**: 7.4/9.0

  CSIR JRF-NET: Qualified for JRF *in* Physical Sciences, December 2002
  GATE: 95.8 percentile *in* Physics (February 2003), All India Rank: 97

Sponsored/Funded Projects undertaken

§1. Kinetics and Dynamics of Amylin Protein at Single-molecule Level using Optical Tweezers, Science and Engineering Research Board (SERB); Total grant: ₹ 25.96 Lakhs

§2. Unraveling cancer transformation and progression through biological, electro-mechanical and computational techniques
(Funding Agency: MHRD, Department of higher education, New Delhi, Total Grant: ₹ 38 Lakhs)

§3. Study misfolding and amyloid formation of amylin protein by laser light scattering
(Funding Agency: ISIRD, SRIC, IIT Kharagpur, Total Grant: ₹ 28 Lakhs)

Conference/Workshop organized

§1. Photonics-2014; member organizing committee, session chair and accommodation-in-charge

§2. 10^{th} National conference on solid state ionics, IIT Kharagpur, 2014

§3. 6^{th} International Conference on Functional Electroceramics and Polymers, member organizing committee, IIT Kharagpur (2017).

Research/Teaching Experience

- **Associate Professor** (27th Oct 2021-) Department of Physics, IIT Kharagpur, West Bengal, India
- **Assistant Professor** (12th Sept 2013-26th Oct 2021) Department of Physics, IIT Kharagpur, West Bengal, India
- **Research Associate** (8th July 2013–8thSeptember 2013)
  Worked on project *Investigating the effects of an anti-prion ligand on the folding of PrP at the single-molecule level with force spectroscopy* at University of Alberta, Edmonton, AB, Canada.
- **Postdoctoral Fellow** (16thDec 2009–7th July 2013)
  Worked on project entitled *Developing Single-Molecule Force Spectroscopy and Fluorescence Assays to Study Protein misfolding and Aggregation* at University of Alberta, Edmonton, Canada.
- **Postdoctoral Fellow** (29thOct 2007–30thNov 2009)
  I worked on *Entropy driven liquid crystalline compaction of super coiled DNA* at Department of Physics in National University of Singapore, Singapore.
- **Teaching Assistantship** for the following M. Sc Courses at SPS/JNU, New Delhi.

  1. Biophysics, Jan–May 2004, Course taken by Prof. Himadri B. Bohidar.
  2. Solid State Physics, Aug–Dec 2005, Course taken by Prof. Deepak Kumar.
  3. Mathematical Physics II , Jan–May 2006, Course taken by Prof. Shankar P. Das

Safety induction training

- At faculty of science, National University of Singapore, Singapore in August 2008

Computer experience

- Proficient in LabVIEW, IGOR-Pro, FORTRAN, MATLAB, MATHEMATICA, Sigma Plot, Latex, Adobe Illustrator etc..

Reviewer of scientific journals

§1. **ACS Applied Bio Material**

§2. **PCCP, (Royal Society of Chemistry)**

§3. **Soft Matter, (Royal Society of Chemistry)**

§4. **Applied Surface Science (Elsevier)**

§5. **Mettalomics (Royal Society of Chemistry)**

Membership of scientific organisation

- Material Research Society, Singapore

Fellowship/Awards

§1. Jawahar Bhavan Trust Yojna Fellowship for one year in 2nd year of M.Sc.

§2. Junior/Senior Research Fellowship during PhD from CSIR, New Delhi.

§3. Travel award of C$ 1000 to present poster in 'PrP Canada 2012 and Protein Folding and Disease Conference' in Toronto.

Citation and *h*-index

Citation: more than 800 Google Scholar *h*-index: 13 Average impact factor: > 6.5

Laboratory Responsibility

§1. In-charge of Teaching Laboratory: M.Tech Teaching lab

Theses Supervision

§1. Ph.D Theses: **(3 ongoing, 2 Defended and 2 submitted)**

§2. M. Tech: **(1 ongoing, 4 completed)**

§3. M.Sc. Theses: **(3 ongoing, 15 completed)**

Course Taught/Teaching

§1. M.Sc./M. Tech/ PhD:

(a) PH61003 (Physics for Medicine and Biology)(CORE Course)(Three semester)
(b) PH60402 (Biophysics) (Elective)(Five semester)
(c) PH41023 (Statistical Physics-1) (Two semester)
(d) PH49009 (Condensed Matter Physics Lab-I)(Three semester)
(e) PH69003 (M.Tech. Lab)(Two semester)

§2. B.Tech

(a) BS20001 (Science of Living System) (CORE Course) (Two semester)
(b) PH41023 (Statistical Physics-1)(Two semester)
(c) PH20003 (Physics-II)(Three semester)
(d) PH11001 (Physics-I)(Three semester)
(e) PH19001 (Physics Lab) (Five semesters)

Department/Institute Level Activities

§1. Associated with 'School of Bioscience' and 'School of Medical Science and Technology'

§2. Member of various departmental committees

§3. MTech Lab-in-charge

§4. Member of purchase committee

§5. Training and Placement in-charge Physics department (2017-18)

§6. Associated with ATDC for conducting interviews for PhD candidates

§7. Institute Representative for GATE and JEE Exam

§8. Secretary (2017-18), Tech. Club, IIT Kharagpur

§9. Assistant Warden: VS Hall (2015-2019)

Teaching Feedback

§1. B.Tech level: Average between 3.1 and 3.9

§2. M.Sc./M. Tech level: Average between 3.5 and 4.2

§3. Lab feedback: Average between 3.3 to 3.8

Selected Publication

§1. Suparna Khatun, Anurag Singh, Kumari Shikha, Agneyo Ganguly, **Amar Nath Gupta** *Plasmid DNA Undergoes Two Compaction Regimes under Macromolecular Crowding*,ACS Macro Letters, 11, 186-192, (2022)

§2. Kumari Shikha, Gugulothu Sriram Bharath, Swagata Mukhopadhyay, Mayukh Chakraborty, Susmita Ghosh, Suparna Khatun, Debajyoti De, Amar Nath Gupta, Agneyo Ganguly *The catalytic core of Leishmania donovani RECQ helicase unwinds a wide spectrum of DNA substrates and is stimulated by replication protein A*, The FEBS Journal (2022)

§3. Anurag Singh, Suparna Khatun, Nisha Pawar, **Amar Nath Gupta** *Interactive patches over amyloid-β oligomers mediate fractal self-assembly*,Physical Review E, 104, 064404, (2021)

§4. Debajyoti De, Nisha Pawar, Amar Nath Gupta *Electric field-driven conformational changes in the elastin protein*, Phys. Chem. Chem. Phys (2021), **23**, 4195-4204

§5. Anurag Singh, Suparna Khatun and Amar Nath Gupta *Simultaneous detection of tyrosine and structure-specific intrinsic fluorescence in the fibrillation of Alzheimer's associated peptides*, ChemPhysChem (2020), doi/abs/10.1002/cphc.202000587.

§6. Debabrata Mandal, Sudipta Biswas, Ananya Chowdhury, Debajyoti De, Chandra Sekhar Tiwary, **Amar Nath Gupta**, Trilok Singh and Amreesh Chandra *Hierarchical cage-frame type nanostructure of CeO2 for bio sensing applications: From glucose to protein detection*, Nanotechnology (2020), https://doi.org/10.1088/1361-6528/abb8a8; (2020).

§7. Debajyoti De, CK Das, D Mandal, M Mandal, N Pawar, A Chandra, and **Amar Nath Gupta**, *Curcumin complexed with graphene derivative for breast cancer therapy*, ACS Appl. Bio Mater. (2020)

§8. Anurag Singh, Suparna Khatun, **Amar Nath Gupta**, *Anisotropy versus fluctuations in fractal self-assembly of gold nanoparticles*, Soft Matter (2020)

§9. Debajyoti De, Anurag Singh, **Amar Nath Gupta**, *Unveiling the transition path region in the one-dimensional free energy landscape of proteins*, Chemical Physics Letters, **750**, 137498, (July 2020)

§10. Prasoon Awasthi, Anurag Singh, Suparna Khatun, **Amar Nath Gupta**, Soumen Das, *Fibril growth captured by electrical properties of amyloid-β and human islet amyloid polypeptide* Phys. Rev. E **101**, 062413 (2020)

§11. Suparna Khatun, Anurag Singh, Somnath Maji, Tapas Kumar Maiti, Nisha Pawar, **Amar Nath Gupta** *Fractal self-assembly and aggregation of human amylin* Soft Matter,DOI: 10.1039/C9SM02463H; (2020)

§12. Debajyoti De, Nisha Pawar, **Amar Nath Gupta** *Glucose-Induced Structural Changes and Anomalous Diffusion of Elastin* Colloids and Surfaces B: Biointerfaces 188, 110776 (2020)

§13. A Sudha, TK Maity, SL Sharma, **AN Gupta** *Gamma irradiation effect on the optical properties of tellurium dioxide films*Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms 461, 171-174 (2019)

§14. Suparna Khatun, Anurag Singh, Debabrata Mandalb, Amreesh Chandraab and **Amar Nath Gupta** *Quantification of protein aggregation rates and quenching effects of amylin–inhibitor complexes* Phys. Chem. Chem. Phys. DOI: 10.1039/C9CP03238J; (2019)

§15. S Khatun, A Singh, N Pawar, **AN Gupta** *Aggregation of amylin: Spectroscopic investigation* International journal of biological macromolecules 133, 1242-1248 (2019)

§16. Debabrata Mandal, Suparna khatun, **Amar Nath Gupta**,Amreesh Chandra *DNA supported graphene quantum dots for Ag ion sensing* Nanotechnology 30 (25), 255501 (2019)

§17. S Khatun, K Shikha, A Ganguly, N Pawar, **AN Gupta** *Repulsive interaction induces fibril formation and their growth* International journal of biological macromolecules 123, 20-25 (2019)

§18. A Sudha, SL Sharma, **AN Gupta** *Achieving sensitive and stable indium oxide thin films for gamma radiation monitoring* Sensors and Actuators A: Physical 285, 378-385 (2019)

§19. A Sudha, TK Maity, SL Sharma, **AN Gupta** *An extensive study on the structural evolution and gamma radiation stability of TeO2 thin films* Materials Science in Semiconductor Processing 74, 347-351 (2018)

§20. A Sudha, SL Sharma, **AN Gupta**, SD Sharma *Tuning the properties of tin oxide thin films for device fabrications* The European Physical Journal B 90 (11), 219 (2017)

§21. **Amar Nath Gupta**, Johan RC van der Maarel *Compaction of plasmid DNA by macromolecular crowding* Macromolecules, 50, 4, 1666-16671, (2017)

§22. **Amar Nath Gupta**, K P Neupane, Negar Rezajooei, Leonardo Cortez, Valerie Sim, M. T. Woodside *Pharmacological chaperone reshapes the energy landscape for folding and aggregation of the prion protein* Nature Communication; (doi:10.1038/ncomms12058 ; 2016)

§23. HB Bohidar, Amar Nath Gupta *Nanoscale Self-Organization of Polyampholytes* Recent Trends In Surface And Colloid Science, Page 231-242, (2012)

§24. **Amar Nath Gupta**, Hao Yu, Xia Lu, K P Neupane, Angela M. Brigley, Iveta Sosova, M. T. Woodside *Energy landscape analysis of native folding of the prion protein yields the diffusion constant, transition path time, and rates* Proceeding of National Academy of Sciences, (USA), 109, 14452-14457, (2012)

§25. **Amar Nath Gupta**, Derek R. Dee, Max Anikovskiy, Iveta Sosova, Elena Grandi, Laura Rivera, Abhilash Vincent, Angela M. Brigley, Nils O. Petersen, Michael T. Woodside *Phthalocyanine tetrasulfonates bind to multiple sites on natively-folded prion protein* (BBA-Proteins and proteomics (Elsevier), 1824, 826-832, (2012)

§26. Hao Yu, Xia Liu, Krishna Neupane, **Amar Nath Gupta**, Angela M. Brigley, Allison Solanki, Iveta Sosov, Michael T. Woodside *Direct observation of multiple misfolding pathways in a single prion protein molecule* Proceeding of National Academy of Sciences (PNAS), USA, 109, 5283 (2012); This article was Editor's choice in science magazine, 336, number 6080issue of 27 April 2012 in Biophysics: Taking the wrong path

§27. **Amar Nath Gupta**, A. Vincent, K. Neupane, Hao Yu, F. Wang, M. T. Woodside *Experimental validation of free energy landscape reconstruction from non-equilibrium single-molecule force spectroscopy measurements*, Nature Physics (Letter), 7, 631 (2011); this article was cited in **news and view** in Nature Physics 7, 591 (2011)

§28. Xiaoying Zhu, Siow Yee Ng, **Amar Nath Gupta**, YP Feng, B Ho, A Lapp, Stefan U. Egelhaaf, VT Forsyth, M Haertlein, M Moulin, Ralf Schweiwns and JRC vd Maarel *Effect of crowding on the conformation of interwound DNA strands from neutron scattering measurements and Monte Carlo simulations* Phys. Rev. E 81, 061905 (2010)

§29. **Amar Nath Gupta** and H.B. Bohidar *Phase separation in aqueous solutions of similarly charged Biopolymers* J. Surface Sc. Technol. 25, 1 (2009)

§30. **Amar Nath Gupta**, H. B. Bohidar *Temporal evolution of self-organization of gelatin molecules and clusters on quartz surface* Phys. Rev. E 76, 051912 (2007)

§31. **Amar Nath Gupta**, V. K. Aswal, H. B. Bohidar *Surface patch binding induced intermolecular complexation and phase separation in aqueous solutions of similarly charged gelatin-chitosan molecules* J. of Phys. Chem. B 111, 10137 (2007)

§32. B. Mohanty, **Amar Nath Gupta**, H. B. Bohidar *Effect of gelatin molecular charge heterogeneity on formation of intermolecular complexes and coacervation transition* Journal of Polymer Science Part B: Polymer Physics 45, Issue 13, 1511 (2007)

§33. Shilpi Boral, **Amar Nath Gupta** and H. Bohidar *Swelling and De-swelling kinetics of gelatin hydrogels in ethanol-water marginal solvent* I J of Bio. Macromol. 39, 240 (2006)

§34. **Amar Nath Gupta**, Reena and H.B.Bohidar *Free energy landscape of alcohol driven coacervation transition in aqueous gelatin solutions* J. Chem. Phys. 125, 054904 (2006)

§35. **Amar Nath Gupta** and H.B.Bohidar *Kinetics of Phase separation in System Exhibiting Simple Coacervation* Phys. Rev. E 72, 011507 (2005)

§36. **Amar Nath Gupta**, B. mohanty and H.B.Bohidar *Flory Temperature and Upper Critical Solution Temperature of Gelatin Solution*, Biomacromolecules 6, 1623 (2005)

Conference Publication

§1. Anurag Singh, Amar Nath Gupta, *Quantifying DNA Elasticity in the Course of Binding of Small Molecule to DNA*, Biophysical Journal, 116, 3, 358a, (2019)

§2. Suparna Khatun, Shikha Kumari, Agneyo Ganguly, Nisha Pawar, Amar Nath Gupta, *Observation of Structural Growth of Fibrils of Amylin Protein*, Biophysical Journal, 116, 3, 492a, (2019)

§3. AN Gupta, *Folding Rate and Transition Path Time of a Single-Molecule Protein*,Biophysical Journal 110 (3), 55a (2016)

§4. KP Neupane, AN Gupta, N Rezajooei, MT Woodside, *Anti-Prion Ligand Binding Promotes Native PrP Folding Over Misfolding at the Single Molecule Level*, Biophysical Journal 108 (2), 204a (2015)

§5. K Neupane, H Yu, D Ritchie, **AN Gupta**, X Liu, DAN Foster, F Wang, I Sosova, Micahel T Woodside, *Transition Path Times for the Folding of Nucleic Acids and Proteins Determined from Experimentally-Reconstructed Energy Landscape Profiles* Biophysical Journal 104 (2), 165a

§6. X Liu, H Yu, **A N Gupta**, K Neupane, AM Brigley, I Sosova, MP Woodside *Reconstruction of the Energy Landscape Profile for Native Folding of the prion Protein from Single-Molecule Force Spectroscopy* Biophysical Journal 102 (3), 54a (2012)

§7. A Vincent, **AN Gupta**, K Neupane, H Yu, M Woodside *Experimental Validation of Free Energy Landscape Reconstructions from Non-Equilibrium Single-Molecule Pulling Experiments* Biophysical Journal 100, 484 (2011)

§8. H Yu, X Liu, AM Brigley, A Solanki, AN Gupta, I Sosova, MT Woodside, *Force Spectroscopy of Mammalian Prion Protein Folding and Misfolding*, Biophysical Journal 100 (3), 23a (2011)

§9. I Sosova, A Vincent, **A Gupta**, M Anikovskiy, A Brigley, MT Woodside *Characterizing the Interaction Between Phthalocyanine Tetrasulfonates and Mammalian Prion Protein* Biophysical Journal 100, 553 (2011)

§10. H Yu, X Liu, AM Brigley, A Solanki, **AN Gupta**, I Sosova, MT Woodside *Force Spectroscopy of Mammalian Prion Protein Folding and Misfolding* Biophysical Journal 100, 23 (2011)

§11. **Amar Nath Gupta**, Xiaoying Zhu, Johan RC Van der Maarel *Study of Salt Effect on Supercoiled Plasmid DNA by Light and Neutron Scattering* DNA Nanoscience and Physics, ICMAT, Singapore 2009

§12. **Amar Nath Gupta**, Xiaoying Zhu, Bow Ho, Johan RC Van der Maarel *Purification of PHSG298 Supercoiled Plasmid DNA Using Anion-exchange Chromatography at Lab Scale* DNA Nanoscience and Physics, ICMAT, Singapore 2009

Book Chapter

§1. H. B. Bohidar and **Amar Nath Gupta** *Nano-scale self-organization of polyampholytes* Recent trends in Surface and colloid Science;Statistical Science and interdisciplinary Science Vol. 12, chapter 6, (2008)

§2. H. B. Bohidar and **Amar Nath Gupta** *Kinetics of phase separation in polyampholytes* in Current Physics Index by American Institute of Physics (2005)

§1. *Protein aggregation kinetics*, at Bangalore,India (19-02-2020 to 21-02-2020), Type: Guest Lecture, Event Name: ICTS-Bangalore.

§2. *Aggregation kinetics of IDPs*, at Jawaharlal Nehru University New Delhi,India (13-11-2019 to 13-11-2019), Type: Invited Lecture, Event Name: Soft Matter Meeting.

§3. *Synergistic combination of graphene quantum dots with DNA for Ag ion sensing*, at Shilong, India,India (11-05-2019 to 13-05- 2019), Type: Guest Lecture, Event Name: Soft Matter Young Investigator Meet.

§4. *Repulsive interaction induces fibril formation and their growth*, at IIT Roorkee,India (06-12-2018 to 09-12-2018)

§5. *DNA in a crowding environment*, at BITS Pilani,India (09-03-2017 to 11-03-2017)

§6. *Dynamics of protein amyloid and metal nanoparticles fractals*, at IIT Kharagpur,India (20-02-2017 to 22-02-2017)

§7. *Locating transition path region in the pathway of protein folding*, at International Center, Goa,India (15-12-2016 to 19-12-2016)

§8. *Transition path time, diffusion constant and folding rates of protein determined from reconstructed free energy landscape analysis* an invited talk at IIT Kanpur on 12^{th} December 2012

§9. *Observing protein folding and misfolding in the single-molecule regime with optical tweezers* an invited talk at National Center for Biological Sciences Bangalore on 3^{rd} December 2012

§10. *Free energy landscape reconstruction of native folding prion protein* an invited talk at Indian Institute of Technology Hyderabad on 30^{th} November 2012

§11. *Reconstruction of free energy landscape of prion protein from non-equilibrium force spectroscopy data* an invited talk at TIFR TCIS on 29^{th} November 2012

§12. *Observing folding and misfolding of a single prion protein by optical tweezers* an invited talk at Indian Institute of Technology Bombay on 27^{th} November 2012

§13. *Transition path time, diffusion constant and folding rate of protein determined from free energy landscape analysis* an invited talk at Indian Institute of Science Bangalore on 22^{nd} November 2012

§14. *Observing protein folding and misfolding in the single-molecule regime with optical tweezers* an invited talk at Indian Institute of Scientific Education and Research Mohali on 19^{th} November 2012

§15. *Direct observation of protein folding/misfolding using single-molecule force spectroscopy* an invited talk at Indian Institute of Technology Ropar on 16^{th} November 2012

§16. *Reconstruction of free energy landscape of prion protein from non-equilibrium force spectroscopy data* an invited talk at Indian Institute of Technology Delhi on 15^{th} November 2012

§17. *Energy landscape analysis of native folding of the prion protein yields the diffusion constant, transition path time, and rates* an invited talk at Young Investigator Meeting Boston, USA on 8^{th} October, 2012

§18. *Reconstruction of Free Energy Landscape for Native Folding of the Prion Protein from Single-Molecule Force Spectroscopy using Optical Tweezers* an invited talk at Regional Centre for Biotechnology, Gurgaon, India on 18^{th}January, 2012

§19. *Free Energy Reconstruction and Verification of Jarzynski Equality from Single Molecule Force Spectroscopy Experimental Data* an invited talk at Indian Institute of Science Education and Research Mohali, India on 28^{th}July, 2010

§20. *Study of Salt Effect on Supercoiled Plasmid DNA by Light and Neutron Scattering* an Oral presentation in ICMAT 2009 on 2^{nd}July, 2009 in Singapore

§21. *Purification of pHSG298 Supercoiled Plasmid DNA Using Anion-exchange Chromatography at Lab Scale* an oral presentation at ICMAT 2009 on 2^{nd}July, 2009 in Singapore

§1. Poster title *Energy landscape analysis of the native folding pathway of the prion protein:diffusion constant, transition path time, and rates* in PrP Canada 2012 and Protein Folding and Disease Conference in Toronto, Canada from 25^{th}-27^{th} June 2012

§2. Poster title *Reconstruction of Free Energy Landscape for Native Folding of the Prion Protein from Single Molecule Force Spectroscopy* in YIM2012 at Lonavala, India on 7^{th}-11^{th} January 2012

§3. Poster title *Reconstruction of the Energy Landscape Profile for Native Folding of the prion Protein from Single-Molecule Force Spectroscopy* in Biophysical Society Meeting in San Diego, USA (2012)

§4. Poster title *Direct observation of Misfolding in single Prion Protein Molecules* presented in PRION2011 in Montreal, Canada on 15^{th}-19^{th} May 2011

§5. Poster title *Characterizing the interaction between phthalocyanine tetrasulfonates and mammalian prion protein* presented in 55^{th} Biophysical Society meeting in Baltimore, USA on March 5^{th}-9^{th}, 2011

§6. Poster title *Experimental validation of free energy landscape reconstructions from non-equilibrium single-molecule pulling experiments* presented in 55^{th} Biophysical Society meeting in Baltimore, USA on March 5^{th}-9^{th},2011

§7. Poster title *Direct observation of multiple misfolding pathways in a single prion protein molecule* presented in 55^{th} Biophysical society annual meeting, Baltimore, USA, March 5^{th}-9^{th}, 2011

§8. Poster title *Single Molecule Force Spectroscopy of Prion Protein Folding/Unfolding Studied with Optical Tweezers* presented in ASM 2010 meeting in Vancouver, Canada on 26^{th} Oct 2010

§9. Attended in *PrP Canada 2010* Scientific meeting in Ottawa, Canada on 9^{th}-10^{th} March 2010

§10. Presented a poster on purification and characterization of supercoiled plasmid DNA in the same conference in ICMAT 2009 in June-July.

§11. Participated in 1^{st} NUS Academic Entrepreneurship Workshop on 10^{th} November 2009

§12. Participated in 2^{nd} Mechanobiology Workshop 2008 which was held from 3 to 5 November 2008 at the Center for Life Sciences, NUS

§13. Participated in Singapore Nanomedicine Workshop 2008 which was held on 22-25^{th} October 2008 at BIOPOLIS, matrix Building Singapore

§14. Participated in join 5^{th} Structural Biology and functional genomics and 1^{st} Biophysical Physics international Conference, held at NUS Singapore on 9^{th}-10^{th}Dec 2008

§15. Participated in Institute of Future Workshop about future of science and innovation on 24^{th} July 2008 at NUS

§16. Participated in workshop on the *frontiers of nano-Science and nano-technology*, held at faculty of engineering in NUS Singapore on 7^{th}Aug 2008

§17. Participated in Workshop on BioMEMS-Micro/Nano-fluidic devices: Simulation and Experimentation Organised by Computational Engineering (CE) Programme at NUS 22^{nd} July 2008

§18. Participated in INFECTIOUS DISEASE SYMPOSIUM: "The Genomics of hosts, pathogens, and their interaction" held at BIOPOLIS, Singapore on 17-18 th June 2008

§19. Participated in the XII workshop on Neutron as probes of condensed matter on 24^{th}-25^{th}Feb 2006 organized by UGC-DAE CSR and SSP Division at BARC, Mumbai

§20. Poster title *Flory temperature and UCST of gelatin solution* presented in ICBC-2005, International Conference on Advances in polymer Blends, composites, IPNS and Gels: Macro to Nano scales held at school of chemical sciences, Kottayam, Kerala on 21^{st}-23^{rd}March 2005

§21. Presented a poster on *Synthesis of gelatin nanoparticles via simple coacervation* in ICSM 2004 at Jadavpur University, Calcutta

§1. **Single-Molecule Force Spectroscopy**: By Dual Trap Laser Optical Tweezers

§2. **Binding Kinetics of Protein with Drug**: By Surface Plasmon Resonance (**SPR**); Iso-Thermal Calorimetry (**ITC**) and Fluorescence Correlation Spectroscopy (**FCS**)

§3. **Size and structure Measurements**: By Atomic Force Microscopy (**AFM**)

§4. **Making of DNA handles**: By Polymerase chain reaction (**PCR**)

§5. **Thin film deposition**: Chromium and gold deposition on SF-10 glass by thermal evaporation and making of sensor chip for **SPR**

§6. **DNA and Protein Purification**: By HPLC (**AKTA** Explorer/Purifier)

§7. **Aggregation Assay for Prion / Alpha-Synuclein Protein**: Th-T assay By Microplate Reader

§8. **Making of Micron-sized channel**: By PDMS casting on the stamp made by proton ion beam writing

§9. **Helicity of protein**: By Circular Dichroism (**CD**); **Turbidity Measurement**: By Colorimeter

§10. **Gel electrophoresis**: Agarose / SDS PAGE and Chloroquine gel electrophoresis

§11. **Protein/DNA expression**: in E. Coli for plasmid DNA and proteins like HU/HNS, Prion and their mutant

§12. **Surface charge measurement (Zeta Potential)**: by **ZEECOM**

§13. **Bio-Nanoparticle Preparation**-Gelatin nanoparticles by simple coacervation

§14. **Size of nanoparticles**: By Dynamic & Static Light and Small Angle Neutron Scattering (**SANS**)

§15. **Drug Release Kinetics**: By Dialysis and UV-Visible Spectrophotometry

§16. **Rheological Properties**: By Rheometer AR 500 (**TA instrument**)

Research experience in various reputed labs

§1. **National Institute for Nanotechnology, University of Alberta, Canada** with **Prof. Nils O. Petersen** on drug binding kinetics by Surface Plasmon Resonance

§2. **Institut Laue-Langevin, Grenoble, France** with **Dr. Ralf Schweins** for Small angle neutron scattering (SANS) measurements on Plasmid DNA under zero average contrast

§3. **Department of Microbiology, NUS, Singapore**, with **Prof. Ho Bow** for Expression of protein and DNA in *E. coli* bacteria

§4. **Biophysics and Complex fluids lab, NUS, Singapore** with **Prof. Johan RC van der Maarel** on Plasmid DNA and protein purification and their characterization

§5. **Centre for Ion Beam Application, NUS, Singapore** with P.G. Shao for making of micron-sized channel

§6. **SSP Division, Bhabha Atomic Research Centre (BARC)**, India with **Dr.VK Aswal** for SANS measurements on gelatin and complex of gelatin-chitosan coacervates.

§7. **Departmental of Biotechnology, JNU**, India with **Prof. Santosh Kar** on curcumin and chitosan

§8. **Department of Physics, IIT Delhi**, India with **Prof. BR Mehta** for AFM measurements

§9. **Semiconductor Lab, SPS, JNU**, India with **Prof P. Sen** for AFM measurements

§1. **Prof. Michael T. Woodside** (Postdoctoral Supervisor)
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§2. **Prof. Nils O. Petersen** (Postdoctoral Co-supervisor)
Department of Chemistry, University of Alberta, Edmonton, Alberta, Canada- T6G 2G2
Email: nils.petersen@ualberta.ca
Phone: +1-780-492-3254; Fax: +1-780-492-8231

§3. **Prof. Johan R.C. van der Maarel** (Postdoctoral Supervisor)
Department of Physics, National University of Singapore, 2 Science Drive 3, Singapore-117 542
Email: johan.maarel@nus.edu.sg
Phone: +65-6516-4396; Fax: +65-6777-6126

§4. **Prof. Himadri B. Bohidar** (Doctoral Supervisor)
School of Physical Sciences, Jawaharlal Nehru University, New Delhi- 110 067
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