

Curriculum Vitae

RUXANDRA I DIMA

Department of Chemistry

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Objective: Perform research in the areas of protein and RNA folding, protein aggregation and the relationship between structure and function with emphasis on disease-related proteins using various methods from computational biology and bioinformatics. Teach courses that emphasize the application of statistical and computational methods to macromolecular systems.

Education:

- 1994 - 1999 *The Pennsylvania State University, Department of Physics*: Ph.D. Thesis "Determination of Essential Ingredients for Protein Folding and Design" (advisor: Prof. Jayanth R. Banavar).
- 1989 - 1994 *University of Bucharest, Romania*: Diploma degree in Physics. Finished fourth in my class of 300 students with a GPA of 9.96/10.

Academic Activity:

- Fall 2005 - present, *University of Massachusetts, Lowell*: Assistant Professor.
- 2000 - 2005, *University of Maryland*: Research Associate with Prof. Devarajan Thirumalai.
- 1997 - 1999, *The Pennsylvania State University*: Research Assistant with Prof. Jayanth R. Banavar.
- 1995 - 1997, *The Pennsylvania State University*: Research Assistant with Prof. Shoudan Liang.
- Fall 1994 - Spring 1997, *The Pennsylvania State University*: Teaching Assistant for introductory physics courses (laboratory or recitation sections).
- 1993 - 1994, *University of Bucharest*: Studies of the Quantum Hall Effect.

Special Computational Skills:

- Monte-Carlo simulations, Molecular Dynamics simulations (MOIL,NAMD), Langevin simulations, Perceptron Method, Annealing, Threading methods (LOOPP), Clustering methods (SPC, PCA)
- C, FORTRAN, UNIX, scripting languages (bash/tcsh, awk, Tcl)

Awards and Scholarships:

1. Award for participation to 2eme Entretiens de Bures, "Folding and self-assembly of macromolecules", Institut des Hautes Etudes Scientifiques, Paris, November 2001.
2. Graduate Student Travel Award from the Division of Biological Physics for the APS Centennial Meeting 1999.
3. Travel Award from Rutgers University for the workshop on "Advances and Opportunities at the Biology-Math-Computation-Physical Sciences Interface", March 1999.
4. Graduate Student Travel Award from the Division of Chemical Physics for the APS March Meeting 1998.
5. Homer F. Braddock Scholarship, The Pennsylvania State University, 1996-1997.

6. National Award of Merit - for ranking in the first 2% of my academic class, 1990-91, 1991-92, 1993-94.
7. Scholarship of the First Degree - for excellent academic results, 1990-91, 1991-92, 1992-93, 1993-94.

Reviewing activities:

Reviewer for the journals "Journal of Chemical Physics", "Protein Engineering, Design, and Selection", "Physical Biology", "Journal of Physics", "Theoretical Biology and Medical Modelling" and "Macromolecules".

Other Activities:

Student representative in University Council, University of Bucharest, 1990-1991.

Member of Computer Committee at the Institute for Physical Science and Technology, University of Maryland, 2003-2005.

Project supervision for C. Hyeon and E. O'Brien (Chemical Physics graduate students, University of Maryland).

Created and taught a "Biocheminformatics" course, Fall 2005, University of Massachusetts, Lowell.

Faculty Senator, University of Massachusetts, Lowell.

Coordinator of the Biochemistry program, Department of Chemistry, University of Massachusetts, Lowell.

Member of the American Physical Society, American Chemical Society, American Association for the Advancement of Science.

Presentations:

1. Contributed talk, "Probing the low-resolution dynamics of biopolymers under force". American Physical Society, Baltimore, MD March 2006.
2. Invited talk, "Glancing at the early-steps of conformational transition in prion proteins through MD simulations", 2005 March Meeting of the American Chemical Society, 13-17 March 2005, San Diego.
3. Invited seminar, University of Texas at Austin, March 31 2005, "Sources of instability in prion proteins: Glancing at early steps in the conformational transition".
4. Invited seminar, University of Massachusetts Lowell, February 9 2005, "Potentials of mean force for structure prediction in RNA; Glancing at early steps in the conformational transition in prions".
5. Invited seminar, University of Texas at Dallas, February 1 2005, "Sources of instability in prion proteins: Glancing at early steps in the conformational transition".
6. Invited seminar, North Carolina State University, 20 January 2005, "Sources of instability in prion proteins: Glancing at early steps in the conformational transition".
7. Invited seminar, Boston University, 9 December 2004, "Sources of instability in prion proteins: Glancing at early steps in the conformational transition".
8. Biophysics Seminar, IPST, University of Maryland, 18 October 2004, "Conformational conversion in prions: A Molecular dynamics perspective".
9. Invited seminar, University of North Carolina, Chapel Hill, 19 February 2004, "Surprising instabilities in prion proteins: Evidence from computational methods applied to sequences and NMR structures".
10. Invited seminar, University of Pittsburgh, Center for Computational Biology and Bioinformatics, 13 February 2004, "Surprising instabilities in prion proteins: Evidence from computational methods applied to sequences and NMR structures".
11. Invited seminar, University of Cincinnati, 17 December 2003, "Surprising instabilities in prion proteins: Evidence from computational methods applied to sequences and NMR structures".
12. Invited seminar, Kent State University, 1 April 2003, "Surprising instabilities in proteins related to Mad Cow disease: Evidence from NMR structures and sequence alignments".

13. Invited seminar, Albert Einstein College of Medicine, 10 March 2003, "Surprising instabilities in proteins related to Mad Cow disease: Evidence from NMR structures and sequence alignments".
14. Invited seminar, Ohio University, 12 February 2003, "Surprising instabilities in proteins related to Mad Cow disease: Evidence from NMR structures and sequence alignments".
15. Invited seminar, University of Massachusetts, Lowell, 31 January 2003, "Surprising instabilities in proteins related to Mad Cow disease: Evidence from NMR structures and sequence alignments".
16. Contributed talk at the Computational Biophysics: Integrating Theoretical Physics and Biology, San Feliu de Gixols, Spain, 7-12 September 2002, "Surprising instabilities in prions: Evidence from NMR structures and sequence alignments".
17. Invited seminar at Computational Biophysics Section, Laboratory of Biophysical Chemistry, NHLBI, NIH, 25 April 2002, "Surprising conformational instabilities in prions".
18. Statistical Physics Seminar, IPST, 23 April 2002, "Surprising instabilities in proteins related to Mad Cow disease".
19. Contributed talk at the 2002 April Meeting of the American Chemical Society, 7-11 April, 2002, Orlando: R. I. Dima and D. Thirumalai, "Exploring Protein Aggregation using simple models: Phase diagram and Kinetics".
20. Statistical Physics Seminar, IPST, 14 March 2000, "Effective Interactions between Amino Acids".
21. Contributed talk at the Centennial Meeting of the APS, 20-26 March, 1999, Atlanta: R. I. Dima, A. Maritan, J. R. Banavar, "Protein design – effective interactions between amino acids and steric constraints".
22. Contributed talk at the 1998 March Meeting of the APS, 16-20 March, 1998, Los Angeles: R. I. Dima, J. R. Banavar, A. Maritan, M. Cieplak, "Statistical Mechanics of Designed Heteropolymers".
23. Contributed talk at the 1997 March Meeting of the APS, 17-21 March, 1997, Kansas City, MO: R. I. Dima, S. Liang, "The Fermi-liquid parameters of different systems that can be described by the one dimensional Hubbard model".

Posters:

1. R. I. Dima and D. Thirumalai, "Proteins associated with diseases present enhanced sequence correlation between charged residues", Biophysical Society Meeting, 14-18 February, 2004, Baltimore, MD.
2. R. I. Dima, J. R. Banavar, A. Maritan, C. Micheletti, G. Settanni, "Extraction of Effective Interactions between Amino Acids", workshop on "Advances and Opportunities at the Biology-Math-Computation-Physical Sciences Interface" 6-8 March 1999, Rutgers University.

Publications:

1. E. O'Brien, R. I. Dima and D. Thirumalai, "Chemical denaturation of helices as revealed by Molecular Dynamics simulations", manuscript in preparation.
2. R. I. Dima and D. Thirumalai, "Probing the role of a disulfide-bond in the dynamics of the helix 2 and helix 3 fragment from PrP^C", manuscript in preparation.
3. R. I. Dima and D. Thirumalai, "Exploring the link between structures of protein families and the sequence correlation among their charged residues", manuscript in preparation.
4. C. Hyeon, R. I. Dima and D. Thirumalai, "Deciphering unfolding pathways and kinetic barriers in mechanical unfolding of RNA and proteins", submitted.
5. C. Hyeon, R. I. Dima and D. Thirumalai, "Size, shape and flexibility of RNA structures", submitted.
6. R. I. Dima and D. Thirumalai, "Determination of network of residues that regulate allostery in protein families using sequence analysis", Prot. Science (2006) (in print).

7. R. I. Dima, C. Hyeon and D. Thirumalai, "Extracting stacking interaction parameters for RNA from the data set of native structures", *J. Mol. Biol.* **347**, 53-69 (2005).
8. R. I. Dima and D. Thirumalai, "Probing the instabilities in the dynamics of helical fragments from mouse PrP^C", *Proc. Natl. Acad. Sci. USA* **101**, 15335 (2004).
9. R. I. Dima and D. Thirumalai, "Asymmetry in the shapes of folded and denatured states of proteins", *J. Phys. Chem. B*, **108**, 6564 (2004).
10. R. I. Dima and D. Thirumalai, "Proteins associated with diseases show enhanced sequence correlation between charged residues", *Bioinformatics*, **20**, 2345 (2004).
11. D. Thirumalai, D. K. Klimov and R. I. Dima, "Emerging ideas in the molecular basis of protein and peptide aggregation", *Curr. Op. Struct. Biol.*, **13**, 146 (2003).
12. R. I. Dima and D. Thirumalai, "Exploring the propensities of helices in PrP^C to form β sheet using NMR structures and sequence alignments", *Biophys. J.*, **83**, 1268 (2002).
13. R.I. Dima and D. Thirumalai, "Exploring protein aggregation and self-propagation using lattice models: Phase diagram and kinetics", *Prot. Sci.*, **11**, 1036 (2002).
14. D. Thirumalai, D.K. Klimov and R.I. Dima, "Insights into specific problems in protein folding using simple concepts", *Adv. Chem. Phys.* **120**, 35 (2002).
15. I. Chang, M. Cieplak, R.I. Dima, A. Maritan and J.R. Banavar, "Protein threading by learning", *Proc. Natl. Acad. Sci. USA*, **98**, 14350 (2001).
16. R.I. Dima, G. Settanni, C. Micheletti, J.R. Banavar and A. Maritan, "Extraction of Interaction Potentials between Amino Acids and between Amino Acids and Solvent Molecules from Native Protein Structures", *J. Chem. Phys.* **112**, 9151 (2000).
17. R.I. Dima, J.R. Banavar, A. Maritan, "Scoring Functions in Protein Folding and Design", *Prot. Sc.* **9**, 812 (2000).
18. R.I. Dima, J.R. Banavar, M. Cieplak and A. Maritan, "Statistical Mechanics of Protein-Like Heteropolymers", *Proc. Natl. Acad. Sci. USA* **96**, 4904 (1999).

References:

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