

summary

Biophysical chemistry faculty member with diverse basic and applied research experience and 12 years in leadership roles aiming to transition into more research-focussed positions requiring critical insight into the complexity of interdependent research programs, building new technical capabilities, brokering knowledge between public and private partners, and assembling the vital components for innovative paths to scientific discovery and development.

core competencies

Recruitment, development, and mentorship of scientists and junior investigators. Strategy, direction, and thought leadership for interdisciplinary research groups. Coordination and budgeting of multiple interdependent projects. Establishment and coordination of internal and external collaborations. Development, writing, and evaluation of research proposals. Spokesperson for multi-disciplinary research department. Presentation of interdisciplinary research to diverse audiences. Broad-ranging and diverse scientific subject matter expertise. Assimilation of large amounts of scientific evidence to build insight into the system of interest. Design of novel experiments. Global data analysis. Publishing in scientific journals.

experience

2010 – ON MONTCLAIR STATE UNIVERSITY

MONTCLAIR, NJ

Associate Professor of Chemistry and Chemical Biology

Faculty member directing independent research program investigating protein folding and aggregation, amyloid formation, nanopore biomolecular analysis, and single molecule biophysics.

Provide strategic and technical leadership for multi-disciplinary data-driven research group of 3–11 chemists, biologists, biochemists, physicists, and engineers, including undergraduates, doctoral students, postdoctoral fellows, and senior visiting scholars.

- ▶ Sole Principal Investigator (PI) with over \$2M in funding, including \$1.2M from NIH R01.
- ▶ CoPI for \$1.0 M in NSF funding.
- ▶ Participating PI for over \$10M in research training grants.
- ▶ Over 2-dozen publications cited 600+ times; 20+ invited university seminars; 45+ conference presentations.
- ▶ Research of the last 4 years featured in *Nature Chemistry* news and on the covers of *J Mol Bio* and *J Phys Chem*.
- ▶ 100% placement of lab trainees into graduate & medical programs, faculty, pharma, or industrial jobs.

Provide expert reviews (>10 years) for major journals and funding agencies (NIH, NSF, Burroughs-Wellcome)

- ▶ Rapidly identify scientific merit and big-picture impact.
- ▶ Evaluate feasibility and appropriateness of scope and timeline of activities.
- ▶ Provide clear and concise feedback.

Provide mentorship and strategic guidance to junior faculty for research, grants, publications, and promotion.

Establish and manage internal and external collaborations to provide synergistic research capabilities.

- ▶ Li Group - U Arkansas - Nanopore fabrication and measurement expertise.
- ▶ Neimark Group - Rutgers U - Coarse grain protein simulations.
- ▶ Blanchard Group - Cornell Weill Med - Interfacial single molecule measurements and advanced fluorophores.
- ▶ Moghe Group - Rutgers U - Functionalization of protein nanoparticles and cell motility assays.

Relocated a 2500 sqft 4 module research facility with ~\$1M in equipment providing spectroscopic, molecular biology, computational, and preparatory chemical capabilities.

- ▶ Used phased lab relocation strategy to optimize lab productivity across two research sites (Rutgers and MSU).
- ▶ Strategy minimized instrument downtime and facilitated onboarding of new researchers at MSU.

Teach Biophysical Statistical Thermodynamics, Biophysical Chem, General Chem, Gen Ed Chem.

- ▶ Developed novel software package to drive class participation via real-time grading of student responses.

2000–2010 RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY**NEW BRUNSWICK, NJ***Member of Chemistry and Chemical Biology doctoral program faculty (2000-2014)**Member of BioMAPS Institute and Institute for Advanced Materials, Devices, and Nanotechnology**Associate Professor of Chemistry and Chemical Biology (2009-2010)*

Chaired Chemistry Dept. “Task Force 2” for publicity, external communication, and industrial relations.

- ▶ Drove establishment of strong industry connections by initiating the seating of an industrial advisory board.
- ▶ Identified key clusters of faculty research for industrial collaboration.

Assistant Professor of Chemistry and Chemical Biology (2000-2009)

Served as department spokesperson for recruiting by presenting all faculty research programs

- ▶ Developed and presented series of 90 second oral/powerpoint “elevator pitch” faculty research summaries
- ▶ Enhanced recruiting, outreach, and fund-raising, targeting university administrators, prospective students, industrial managers and executives, collaborators, politicians, lobbyists, and prospective donors.

Spearheaded “nano-bio” section of \$629M NJ Jobs Growth & Economic Development proposal

- ▶ Proposal led to founding of Rutgers Institute for Advanced Materials, Devices, and Nanotechnology

Designed and supervised renovations, purchasing, outfitting, and setup of a new research laboratory

- ▶ Provided wet chemistry, spectroscopy, laser, and protein expression capabilities for single molecule, biophysical, molecular biology, and protein aggregation and folding research.
- ▶ Built and programmed state-of-the-art single molecule microscope with multichannel picosecond-resolved photon-by-photon fluorescence lifetime and polarization capability.

Developed and implemented protocols for cloning, expression, purification, and labeling of:

- ▶ alpha-synuclein - for protein aggregation, amyloid formation, Parkinson’s disease.
- ▶ lambda-repressor - for protein folding, stability, structure, and gene regulation.
- ▶ glucose/galactose binding protein - for protein structural fluctuations and ligand binding studies, chemotaxis.

Identification, development, optimization, and troubleshooting of traditional and novel biophysical assays.

- ▶ Identified multiple binding sites in beta-lactoglobulin using [novel fluorescence approach to thermal shift assays](#).
- ▶ Determined structural instability contribution to aggregation behavior of beta-lactoglobulin. [Published in JMB](#).
- ▶ Developed new approach to measuring protein receptor allostery and applied it to study changes in glucose/galactose binding protein structural instability upon ligand binding. [Published in Biophys. J.](#)
- ▶ Identified the key, potentially targetable, aggregation activation step for alpha-synuclein — the main protein associated with aggregated proteinaceous/amyloid intracellular lesions in Parkinson’s disease. [Published in JACS](#).

selected awards/honors/service

2006–on NIH Study Sections F04B, MSFB, ZRG1 BST-M 58, BBM, ZRG1 F01R, ZRG1 F04B-P.

5/2002 Research Corporation — Research Innovation Award.

1/1997 NIH/NRSA Postdoctoral Fellowship.

6/1996 UCLA Award for Best Physical Chemistry Dissertation.

10/1994 Bauer prize for excellence in graduate research.

education/training**1996–2000 UNIVERSITY OF PENNSYLVANIA****PHILADELPHIA, PA***NIH: National Research Service Award Postdoctoral Fellow*

Built novel technical platform for ultrafast protein unfolding investigations featuring:

- ▶ temperature jump and/or optical initiation of protein folding or unfolding
- ▶ picosecond transient mid-infrared spectrometer to measure changes in protein secondary structure
- ▶ gapless temporal coverage from 20 ps to 1 ms (10⁶ improvement) and 50 μOD noise (20x improvement).

Created novel technical platform for single molecule fluorescence studies of single molecules:

- ▶ 2-channel photon-by-photon capability for energy transfer (FRET) distance measurements
- ▶ solution phase and interfacial protein folding measurements
- ▶ applied approach to the folding and unfolding of a 2 helix bundle protein
- ▶ automated data analysis to handle GB quantities of data.

1991–1996 UNIVERSITY OF CALIFORNIA, LOS ANGELES**LOS ANGELES, CA***Ph.D. in Physical Chemistry (1996)*

Dissertation: *Time-dependent theory of vibronic interactions and gas phase photolysis studies of chemical vapor deposition precursors.*
Graduate Research Fellow

- ▶ Designed, built and used apparatus to study the photofragmentation of gas phase single source metal-organic chemical vapor deposition precursors.
- ▶ Synthesis and purification of chemical vapor deposition precursors.
- ▶ Maintained and repaired excimer lasers, dye lasers, ion lasers, spectrometers, and vacuum systems.

1988–1991 OCCIDENTAL COLLEGE**LOS ANGELES, CA***A.B. in Chemistry and Biochemistry (ACS certified) with minor in Mathematics (1991)**Research Assistant*

- ▶ Streamlined isolation procedure to optimize production of high activity enzyme from human erythrocytes.
- ▶ Used downstream product inhibition enzyme kinetics to probe the active site and allostery of an enzyme.
- ▶ Used ³¹P NMR to study the binding of metabolic ligands to glucose-6-phosphate dehydrogenase.

Lead Chemistry Tutor - Learning Resource Center

- ▶ Developed comprehensive peer-based tutoring program.
- ▶ Implemented subject based test banks.
- ▶ Outstanding service award from Chemistry Society (recognized by alpha chi sigma national chapter award).

selected relevant publicationsFull list [available online http://www.talaga.name](http://www.talaga.name)

- ▶ Vishnyakov, A. Talaga, D.S. Neimark, A.V. DPD Simulation of Protein Conformations: From α -Helices to β -Structures. *J Phys Chem Lett* (2012), 3, 3081-3087.
- ▶ Bradley Ledden, Daniel Fologea, David S. Talaga, Jiali Li, [Chapter 6](#): Sensing Single Protein Molecules with Solid-state Nanopores. *Nanopores: Sensing and Fundamental Biological Interactions* Ed. Rashid Bashir and Samir Iqbal Springer, New York, NY (2011).
- ▶ Vitarelli, M. J. J., Prakash, S. & Talaga, D. S. Determining Nanocapillary Geometry from Electrochemical Impedance Spectroscopy Using a Variable Topology Network Circuit Model. *Anal. Chem.* 83, 533–541 (2011).
- ▶ Pronchik, J., He, X., Giurleo, J. T. & Talaga, D. S. In Vitro Formation of Amyloid from alpha-Synuclein Is Dominated by Reactions at Hydrophobic Interfaces. *J. Am. Chem. Soc.* 132, 9797–9803 (2010). (**Reported in Nature Chemistry News**).
- ▶ He, X., Giurleo, J. T. & Talaga, D. S. Role of Small Oligomers on the Amyloidogenic Aggregation Free-Energy Landscape. *J. Mol. Biol.* 395, 134–154 (2010).
- ▶ Talaga, D. S. Information-Theoretical Analysis of Time-Correlated Single-Photon Counting Measurements of Single Molecules. *J Phys Chem A* 113, 5251–5263 (2009). (**Cover Article**).
- ▶ Talaga, D. S. & Li, J. Single-Molecule Protein Unfolding in Solid State Nanopores. *J. Am. Chem. Soc.* 131, 9287–9297 (2009).
- ▶ Giurleo, J. T., He, X. & Talaga, D. S. beta-lactoglobulin assembles into amyloid through sequential aggregated intermediates. *J. Mol. Biol.* 381, 1332–1348 (2008). (**Cover Article**).
- ▶ Pronchik, J. Giurleo, J. T. & Talaga, D. S. Separation and analysis of dynamic Stokes shift with multiple fluorescence environments: Coumarin 153 in bovine β -lactoglobulin A. *J. Phys Chem B* 112, 11422–11434 (2008).
- ▶ Messina, T. C. & Talaga, D. S. Protein free energy landscapes remodeled by ligand binding. *Biophys. J.* 93, 579–585 (2007). (**identified conformationally dependent binding affinity**)
- ▶ Talaga, D.S.; Lau, W.L.; Roder, H.; Tang, J.; Jia, Y.; DeGrado, W.F.; Hochstrasser, R.M. Dynamics and folding of single two-stranded coiled-coil peptides studied by fluorescent energy transfer confocal microscopy. *Proc Nat Acad Sci USA* 97, 13021–6 (2000). (**over 170 citations**)

personal

Avid opera and theater fan, enjoys minor league baseball, swing dancing, winemaking, and skiing.