CURRICULUM VITAE

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EDUCATION

- **Graduate**, Ph.D., Environmental Engineering, Yale University, New Haven, CT, Expected 2021
- **Undergraduate**, B.A., Chemistry, Bard College, Annandale-on-Hudson, NY, 2006-2010
- **High School**, School of the Future, New York, NY, 2002-2006

PROFESSIONAL RESEARCH EXPERIENCE

The Rockefeller University, 03/2011- 08/2015

- Research Technician I, Howard Hughes Medical Institute at the Rockefeller University, Günter Blobel, M.D., Ph.D., Laboratory of Cell Biology.
  Research efforts aim to elucidate nuclear pore complex structure at atomic resolution and explain how the nuclear pore complex regulates macromolecular transport into and out of the nucleus.

  - Created over 400 recombinant DNA constructs encoding for full-length, and segments thereof, of *Saccharomyces cerevisiae* and *Homo sapiens* nucleoporins. Expressed proteins in bacterial (*Escherichia coli* BL21-CodonPlus(DE3)-RIL cells) and baculovirus-insect cell (Hi5 and Sf9 cell lines) expression systems.
  - Regularly performed large-scale expression and purification of recombinant His-tagged or GST-tagged proteins by fast protein liquid chromatography (FPLC).
  - Used pull-down assays for primary investigation of the interaction of two or more proteins and for initial study of minimal binding domains.
  - Analyzed protein-protein and peptide-protein complexes by gel filtration chromatography.
  - Performed multiangle light scattering (MALS) experiments in conjunction with size exclusion chromatography for determination of absolute molar mass and average particle size in solution, independent of column calibration, in order to analyze the composition of higher order molecular species- several protein complexes and oligomeric states.
  - Examined protein-DNA and protein-RNA binding by the affinity electrophoresis technique, electrophoretic mobility shift assay (EMSA).
  - Determined peptide-protein affinities and complete thermodynamic parameters characterizing the binding reactions by isothermal titration calorimetry (ITC) studies.
  - Used microscale thermophoresis (MST) to study peptide-protein interactions; determined dissociation constants of reactions and stoichiometry of interactions.
  - Conducted limited proteolysis experiments of protein complexes. Results were analyzed by mass- spectrometry in order to determine minimal binding domains.
  - Imaged protein complexes using transmission electron microscope (TEM) with single particle analysis of negatively stained samples to view complex shapes.
  - Conducted fluorescence polarization/anisotropy (FPA) experiments to measure DNA-protein binding.
  - Carried out protein crystal growth screening trials and followed up with optimization of crystallization condition.

- Collected single-crystal X-ray diffraction data (at the National Synchrotron Light Source, Brookhaven National Laboratory, beam line X29) to be analyzed for structural determination of nucleoporins (segments thereof and complexes) at atomic resolution.
- Worked closely with a team of other scientists to design and carry out experiments, analyze data and write/ edit manuscripts for publication.
- Carried out the experiments mentioned above for several projects simultaneously and maked technical decisions on the fly. Nearly all research efforts reflect our interest in better understanding the nature of adaptor nucleoporins and their interactions with other nucleoporins, DNA, RNA and transport factors. The ultimate goal was to determine the structures at atomic resolution.
- Contributed to the development of a recombinant baculoviral library encoding for *Saccharomyces cerevisiae* and *Homo sapiens* nucleoporins (and segments there of) using the baculovirus-insect cell expression system.
- Initiated and enforced the recycling of aluminum, plastic bags, hard plastics, packaging and paper in the laboratory. Promoted water and energy conservation in the laboratory.

PUBLICATIONS

Peer reviewed

Seo HS, Blus BJ, **Janković NZ** and Blobel G. Structure and nucleic acid binding activity of the nucleoporin Nup157. *Proceedings of the National Academy of Sciences of the United States of America*, 2013 OCT 8, Vol. 110(41), pp.16450-5.

BLOBEL LAB RESEARCH

The Rockefeller University, 10/2013- 08/2015

The primary focus of our research efforts was a logical follow up of our interest in Nup157's interactions. Our aim was to determine the crystal structure of the complex scNup157: scNup53, using our crystalized Nup157 fragment with peptide segments of the C-terminus of Nup53. We were studying the biochemistry and biophysics of the interaction in order to gain a better understanding of the nature of the complex. We have characterized the thermodynamics of binding and determined ever-smaller peptides of Nup53, which constitute the minimal binding domain. Although, thermodynamic parameters give us insight into the nature of the interaction, such as the binding affinity and stoichiometry of complex, ultimately a complete understanding will come from determining the structure, and thus binding interface, of the complex at atomic resolution.

ACADEMIC PROJECTS

Bard College, 09/2009-05/2010

- **Baccalaureate thesis in physical and materials chemistry** under the mentorship of Simeen Sattar, Ph.D.

  Janković, Nina. Semiempirical calculations for a model of stage-1 lithium intercalated graphite: structures and energetics. *Division of Science, Mathematics & Computing of Bard College*, Stevenson Library Collections, Bard College, Annandale-on-Hudson, NY, 2010.

  - The overall interest of this study was to determine why stage-1 lithium intercalated graphite (LIG) forms a unique in-plane p($\sqrt{3}\times\sqrt{3}$)R30° structure, unlike the other stage-1 alkali metal graphite intercalation compounds (GIC) that form p(2×2)R0° in-plane structures. To answer this question, a two-layer lithium intercalated circumcoronene dimer model, $Li_7(C_{54}H_{18})_2$,

designed to simulate bulk LIG was theoretically investigated in semiempirical calculations by the AM1, RM1 and PM3 methods. Single-point energy calculations were evaluated for the model, in order to investigate the total energy (Etot), net charges on the Li intercalant atoms and the HOMO-LUMO gap of the native stage-1 in-plane p(√3Å~√3)R30° structure in comparison to the in-plane p(2Å~2)R0° structure that is observed for the stage-1 K, Rb, and Cs GICs.

- Dissertation was defended by oral presentation to a committee of three faculty members from the division.

Bard College, 09/2009-12/2009

- **Writing About Science course anthology** with Elizabeth Frank, Ph.D., *The Grand Canonical Ensemble: The Bard Anthology Of Science Writing, Second Series 2009*. Edited by Elizabeth Frank, Annandale-on-Hudson, 2010.

    - Contributed three articles to anthology: Entropy is Time's Arrow, Translation Piece: The Chemical Structure of a Molecule Resolved by Atomic Force Microscopy, and Book Review: Jeremy Bernstein's Quantum Leaps.
    - Constructed title and cover art of the anthology.

STUDENT RESEARCH EXPERIECE
Yale University, 09/2015- Present

- **Ph.D. Student Researcher**, Chemical & Environmental Engineering, Yale University, Desirée L. Plata, Ph.D., Laboratory of Innovation for Environmental Stability.
  Ongoing research efforts aim to incorporate environmental objectives in the design of novel materials and technologies for sustainable solutions to challenges in climate, water and energy in a world of finite resources.

    - Assessing the potential influence of nanotechnology on global anthropogenic element cycles.
    - Method development for characterization of CNT-enabled materials, which are to be used in a novel technology for the separation and reclamation of specialty metals from highly mixed metal waste streams via electrochemical deposition.
    - Determined elemental background composition of CNT-enabled filters via ICP-MS.
    - Tested the effects of acid treatment on the morphology of CNT-enabled filters via SEM imaging.
    - Measured the effect of electrolytic filtration on the pH of solutions used in electrochemical deposition technology.

Columbia University Medical Center, 06/2009-08/2009

- **Summer Undergraduate Internship** at the Division of Clinical Pharmacology and Experimental Therapeutics under the mentorship of Steven K. Taylor, Ph.D. in the Milan Stojanovic, Ph.D., laboratory

    - Explored movement of polycatalytic nanoassemblies on recognition surfaces with two- and four-legged molecular spiders (deoxyribozymes).
    - Analyzed kinetic data of catalytic spider movement over oligonucleotide substrates. The rates of diffusion of spider molecules through a matrix of substrates were obtained using surface

plasmon resonance (Biacore systems). The movement of spider molecules was varied through the number of catalytic units and the length of substrate/ product recognition regions.[1]

- Developed a quantitative method for comparison of the kinetics of various polycatalytic assemblies and substrates, including real time cleavage rates in "flow" and "no flow" environments.
- Absorbencies were measured using UV/Vis spectroscopy to determine concentrations of substrate and spider molecules. Luminescence spectroscopy was used to determine whether substrate cleavage occurred with particular substrate-spider systems.

Bard College, 06/2007-08/2007

- **Summer Undergraduate Internship** at the Bard College Chemistry Program under the mentorship of Craig Anderson, Ph.D. (organometallic chemistry)

  - Worked on the study of luminescent cyclometallated complexes of platinum (II) and platinum (IV). These chiral orthometallated platinum complexes with various chelating ligands exhibit interesting photophysical and spectroscopic properties. Manipulation of ligand architecture varies the photophysical properties of such complexes, which have applications as solar energy converters and organic light-emitting diodes.
  - Synthesized a set of bidentate and tridentate ligands with N^N, C^N and C^N^N binding modes. The ligand framework was based on biphenyl pyridine, triphenyl pyridine, pyrimidyl groups, phenyl rings and imines. Ligand template was prepared using a series of Grignard and coupling reactions. In addition, tridentate ligands with the novel C^C^N coordination mode were investigated.
  - Synthesized several cyclometallated platinum complexes. The ligand coordinates to a platinum dimmer species through the nitrogen and the adjacent ring orthometallates. In the case of bidentate ligands with binding mode N^N cyclometallation does not occur, rather the ligand coordinates to the platinum complex through one imine nitrogen atom and one amine nitrogen atom. The platinum dimmer, $[Pt_2Me_4(SMe_2)_2]$, was also synthesized.
  - Characterized complexes by multinuclear NMR, FT- IR and GC/MS.

Bard College Independent Research, 09/2007- 05/2008

- **Undergraduate Independent Research** at the Bard College Chemistry Program under the mentorship of Craig Anderson, Ph.D. (organometallic chemistry)

  - Continued summer internship research as described above. Developed design and synthesis of new orthometallated platinum complexes, with variations on ligand architecture. Improved on methodologies used to synthesize and isolate complexes in order to better characterize cyclometallated complexes.
  - Involved in the synthesis and evaluation of di- and multi-nuclear complexes of platinum and/or ruthenium. Bridging ligands were used in these complexes that contain nitrogen, sulphur or

[1] Pei, R.; Taylor, S. Behavior of Polycatalytic Assemblies in a Substrate-Displaying Matrix. *J. Am. Chem. Soc.* **2006**, 128, 12693- 12699.

phosphorus. It is suggested that these complexes have potentially selective anti-tumor properties.

NASA Goddard Institute for Space Studies and Earth Pledge, 09/2003-06/2004

- **Student Researcher** at School of the Future under the mentorship of Allison Godshall

  - Designed and generated a green-roof model in order to simulate green-roof conditions on the roof of the school of the future building, using a modular green-roof system.
  - Collected data for water retention capacities of the modular green-roof system.
  - Analyzed the impact of potential citywide green-roofs. Projected that the accumulation of stormwater in green-roof systems reduces NYC's combined stormwater-sewage overflows (CSOs) by retaining (and evaporating) and delaying stormwater runoff.
  - Investigated the temperature regulation properties of green-roofs on city buildings, i.e. green-roofs serve as insulators and have applications in energy conservation.

TEACHING EXPERIENCE

- Private tutor for high-school student, Dunja Novakovic, at Nightingale-Bamford School in chemistry, physics and pre-calculus, Fall 2013/ Spring 2015.
- Organic chemistry laboratory classes teaching assistant to Emily McLaughlin at Bard College, Fall 2008/ Spring 2009.
- General chemistry tutor at the Bard Academic Resource Center- Bard College, Fall 2007/ Spring 2008.

PRESENTATIONS

- "A Novel Electrochemical Process for Metal Reclamation" –oral presentation, Chemical and Environmental Engineering, School of Engineering and Applied Sciences, Yale University, 12/2015.
- "Semiempirical calculations for a model of stage-1 lithium intercalated graphite: structures and energetics" –poster presentation at the Senior Project Poster Session Spring 2010, Division of Science, Mathematics, and Computing, Bard College, 05/11/2010.
- "Viridian Green Roof Project" –oral presentation at NASA Goddard Institute for Space Studies with Earth Pledge: New York Ecological Infrastructure Study, Columbia University, 06/2004.

RELEVANT COURSEWORK

- **Graduate**: Environmental Transport Processes, Materials Chemistry, Environmental Physiochemical Processes, Water Chemistry, Introductory Data Analysis, Biological Processes in Environmental Engineering
- **Undergraduate**: Physical Chemistry I/II, Topics in Physical Chemistry Tutorial, Chemical Kinetics Tutorial, Batteries Tutorial, Mathematical Methods in the Physical Sciences I/II, Advanced Inorganic Chemistry, Analytical Chemistry, Calculus I/II, Linear Algebra with Applications, Basic Principles of Chemistry I/II, Introduction to Physics I/II, Organic Chemistry I/II, Subcellular Biology, Organismal Biology, Cosmology, Writing About Science.

INSTRUMENTATION, LABORATORY TECHNIQUES AND SKILLS

- MALS, FPLC, ITC, ICP-MS MST, TEM, SEM, FPA, UV-Vis spectroscopy, luminescence spectroscopy, X-ray crystallography, multinuclear NMR spectroscopy, IR spectroscopy, surface plasmon resonance- BIAcore instrument, mosquito crystal robot, formulator liquid handler, phoenix nano-volume liquid handler, automounting robot and manual mounting at synchrotron (BNL: X29), minstrel DT UV crystal imaging and protein crystal monitoring system.
- PCR, LIC, PAGE, AGE, SDM, DNA extraction, protein purification, EMSA, limited proteolysis, dialysis, cell culture maintenance, bacterial transformation, DNA transfection, large scale bacterial flask growth and batch fermentation, competent cell preparation, distillation.
- Molecular modeling, data processing and computational analysis software: PyMOL, DNASTAR, HyperChem, HKL-2000 (basic), R
- Quantitative reasoning, analytical approach, aptness for teamwork, fast learner.

LANGUAGES

- English (fluent), Serbo-Croatian (native)

AWARDS & HONORS

- 2016 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Fellowship
- Recipient of Doctoral University Fellowship, Yale University, Graduate School of Arts & Sciences, 2015-2016
- Recipient of Excellence and Equal Cost (EEC) Scholarship at Bard College, 2006-2010
- Recipient of the Institute On Cslimate and Planets NASA Student Research Award at the NASA Goddard Institute for Space Studies, 2004
- Recipient of Most Outstanding Student Award at School of the Future, 2004

References Available Upon Request