



Nathan A. Oyler
National Institutes of Health
Laboratory of Chemical Physics, NIDDK
Building 5, Room 406
Bethesda, MD 20892-0520
Ph: 301-402-4687 Fax: 301-496-0825
noyler@speck.nidk.nih.gov

Biocomplexity Faculty Search Committee
c/o Prof. Rob de Ruyter van Steveninck
Department of Physics
Indiana University
Swain Hall West 117
Bloomington, IN 47405-7105

Dear Search Committee

I am writing to you in application for the tenure-track biocomplexity faculty position in the Department of Physics. My career research interests are focused on developing and applying solid-state NMR methods to determine structural constraints in biological systems. Since receiving my Ph.D. in late 2000, I have been a post-doctoral fellow at the National Institute of Diabetes and Digestive and Kidney Diseases. As a graduate student and as a post-doc I developed and applied SSNMR methods to determine detailed internal molecular structure of peptides such as (most recently) the Alzheimer's β -amyloid peptide in its fibrillar form.

I am strongly committed to graduate and undergraduate education. I believe a strong foundation in fundamental courses is requisite for the wide range of careers that students will engage in. As a teaching assistant, I have taught undergraduates in general chemistry and physical chemistry. I would feel comfortable teaching classes in general chemistry, physical chemistry, quantum mechanics, analytical chemistry, biophysics, and spectroscopy. Having experienced the benefits of undergraduate research myself, I feel it is an excellent way for students to learn to apply their knowledge and expand their appreciation for the natural world and I would be delighted to include them in my research program.

Enclosed please find a copy of my curriculum vita, past and future research interests, and teaching philosophy. Dr. Robert Tycko, Dr. Gary Drobny, and Dr. Angel C. de Dios have each agreed to send a letter to you recommending me for this position, and I anticipate you will receive them soon.

Thank you for your consideration.

Sincerely,

Nathan A. Oyler, Ph.D.

Nathan A. Oyler

Current Address:
Laboratory of Chemical Physics/NIDDK
National Institutes of Health
Bldg 5, Room 406
Bethesda, MD 20892-0520
(301) 402-4687 Fax: (301) 496-0825

Home Address:
3203 McComas Ave
Kensington, MD 20895
(301) 524-4643
naoyler@earthlink.net

Formal Education

University of Washington,
Doctor of Philosophy, Physical Chemistry

Seattle, WA
Sep. 1994 – Aug. 2000

University of Arizona,
Bachelor of Science, Chemistry

Tucson, AZ
Jan. 1991 – Jun. 1994

Scottsdale Community College,
Transferred to Univ. of Arizona

Scottsdale, AZ
Sep. 1989 – Dec. 1990

Research Experience

National Institutes of Health (LCP/NIDDK)

Bethesda, MD

Research Fellow (Solid State Nuclear Magnetic Resonance)

2004 - present

Postdoctoral Fellow (Solid State Nuclear Magnetic Resonance)

2001 - 2004

Supervisor: Robert Tycko, PhD.

- Involved in a large-scale project to determine the secondary and tertiary structure of the β -amyloid peptide important in Alzheimer's disease.
- Extended previous n-spin SSNMR simulation code to include a pseudo dimension consisting of phase shifts and to allow for an arbitrary n-dimensional RF pulse sequence.
- Developed a method to generate high orders of multiple quantum in very fast spinning MAS experiments.
- Developed a method to determine orientational constraints on the internal structure of β -amyloid fibrils using solid state NMR of fibrils adsorbed to a surface.
- Resurrected and operated a tapping mode atomic force microscope to acquire images of fibrils adsorbed to a surface.
- Synthesized and purified various peptides using a commercial peptide synthesizer and HPLC.

University of Washington

Seattle, WA

Research Assistant (Solid State Nuclear Magnetic Resonance)

1994 – 2000

Supervisor: Professor Gary Drobny

- Developed n-spin SSNMR density matrix simulation code written in C++. The code may be used to simulate nearly arbitrary 1-D, 2-D, and synchronous sampling experiments.
- Extensively involved in projects to determine the structure of small biologically relevant molecules including peptides, nucleosides and short DNA fragments.

Nathan A. Oyler

- Developed the use of ^{15}N - ^{15}N DRAWS, a homonuclear dipolar recoupling technique, as a tool to measure distances in peptides and nucleosides.
- Designed, maintained, and/or repaired equipment including high/low/bandpass RF filters, duplexors, MAS spinning systems, and NMR probe components.

University of Arizona

Tucson, AZ

Research Assistant (Computational Chemistry)

1993 – 1994

Supervisor: Professor Ludwik Adamowicz

- Modeled the behavior of HF in the solution state by *ab initio* calculations.
- Developed software in C to perform large scale calculations of various size clusters of HF molecules (a wrapper function to run the GAUSSIAN 90 program).
- Extensively used the GAUSSIAN90 program to study electron attachment to nucleic acid bases in the gas phase.

University of Alberta

Edmonton, Alberta

Research Assistant (Lipid Biochemistry)

Summer 1992

Supervisor: Professor Dennis Vance

- Assisted in experiments performed on *Schlerynchyma* (skin) cells to help determine the biological pathways used in the production of phospholipids.
- Performed a variety of experiments including radioisotope labeling and detection in cells. Maintained the *Schlerynchyma* cell line.

Teaching Experience

University of Washington

Seattle, WA

Teaching Assistant

1994 – 2000

- Taught introductory lab skills in general chemistry to hundreds of students. Taught senior level lab skills in physical chemistry to undergraduate seniors.
- Implemented coursework and taught general chemistry to hundreds of students in quiz sections.

Scottsdale Community College

Scottsdale, AZ

Tutor

1989-1990

- Tutored students in Algebra, Trigonometry, Calculus, Chemistry and Computer Programming (PASCAL).

Honors and Awards

University of Washington

Seattle, WA

- Bernard Nist Fellowship

University of Arizona

Tucson, AZ

- Dean's List
- Outstanding Undergraduate Poster Award

Nathan A. Oyler

Papers Published

1. 'Absolute Structural Constraints on Amyloid Fibrils from Solid-State NMR Spectroscopy of Partially Oriented Samples' by Oyler, N. A. and Tycko, R., *Journal of the American Chemical Society*; 2004, 126(14); 4479-4480.
2. 'A Study of Homonuclear Dipolar Recoupling Pulse Sequences in Solid-State Nuclear Magnetic Resonance' by Karlsson, T., Popham, J. M., Long, J. R., Oyler, N. and Drobny, G.P., *Journal of the American Chemical Society*; 2003, 125(24); 7394-7407.
3. 'Multiple Quantum ^{13}C NMR Spectroscopy in Solids under High-Speed Magic-Angle Spinning' by Oyler, N. A. and Tycko, R., *Journal of Physical Chemistry B*; 2002, 106(33); 8382-8389.
4. 'Supramolecular Structure in Full-Length Alzheimer's β -Amyloid Fibrils: Evidence for a Parallel β -Sheet Organization from Solid-State Nuclear Magnetic Resonance' by Balbach, J. J., Petkova, A. T., Oyler, N. A., Gordon, D. J., Meredith, S. C., and Tycko, R., *Biophysical Journal*; 2002, 83; 1205-1216.
5. 'Assembly of α -helical Peptide Coatings on Hydrophobic Surfaces' by Long, J. R., Oyler, N. A., Drobny, G. P., and Stayton, P. S., *Journal of the American Chemical Society*; 2002, 124(22); 6297-6303.
6. 'Carbon-proton dipolar decoupling in REDOR' by Mehta, A. K., Hirsh, D. J., Oyler, N. A., Drobny, G. P., and Schaefer, J., *Journal of Magnetic Resonance*; 2000, 145(1); 156-158.
7. 'Determination of Torsion Angles in Proteins and Peptides Using Solid State NMR' by Bower, P. V., Oyler, N. A., Mehta, M. A., Long, J. R., Stayton, P. S., and Drobny, G. P., *Journal of the American Chemical Society*; 1999, 121(36); 8373-8375.
8. 'Distance Measurements in Multiply Labeled Crystalline Cytidines by Dipolar Recoupling Solid State NMR' by Kiihne, S. R., Geahigan, K. B., Oyler, N. A., Zebroski, H., Mehta, M. A., and Drobny, G. P. *The Journal of Physical Chemistry A*; 1999; 103(20); 3890-3903.
9. 'Dipole-Bound Excess-Electron States of Adenine Tautomers. A Theoretical ab initio Study', by Roehrig, G. H., Oyler, N. A., and Adamowicz, L. *Journal of Physical Chemistry*; 1995; 99(39); 14285-14289.
10. 'Can Electron Attachment Alter Tautomeric Equilibrium of Guanine? Theoretical ab initio Study' by Roehrig, G. H., Oyler, N. A., and Adamowicz, L. *Chemical Physics Letters*; 1994; 225(1-3); 265-272.
11. 'Theoretical ab initio Calculations of the Electron Affinity of Thymine' by Oyler, N. A., and Adamowicz, L. *Chemical Physics Letters*; 1994; 219(3-4); 223-227.

Nathan A. Oyler

12. 'Proton-Transferring Systems Studied by Vibrational Spectroscopy and Theoretical ab initio Calculations: The S0 and T1 States of [2,2'-Bipyridine]-3,3'-diol.' by Mordzinski, A., Kownacki, K., Les, A., Oyler, N. A., Adamowicz, L., Langkilde, F. W., and Wilbrandt, R. Journal of Physical Chemistry; 1994; 98(20); 5212-5220.
13. 'Electron Attachment to Uracil. Theoretical ab initio study' by Oyler, N. A., and Adamowicz, L. Journal of Physical Chemistry; 1993; 97(42); 11122-11123.

Posters Presented

1. Experimental NMR Conference 2004: 'NMR of Surface Adsorbed β -Amyloid Fibrils' by Nathan A. Oyler and Robert Tycko
2. Gordon Conference on Magnetic Resonance 2003: 'NMR of Surface Adsorbed β -Amyloid Fibrils' by Nathan A. Oyler and Robert Tycko
3. Gordon Conference on Magnetic Resonance 2001: 'Multiple quantum excitation of rare spin half nuclei in high speed spinning solids' by Nathan A. Oyler and Robert Tycko
4. Experimental NMR Conference 2000: 'Determination of ^{15}N Chemical Shift Tensors and Tensor Orientations in ^{15}N , ^{13}C Labeled Nucleosides: A work in progress.' by Nathan A. Oyler, Karen B. Geahigan and Gary P. Drobny
5. Rocky Mountain Conference on NMR 1999: 'Determination of the orientation of the Glycine Alpha Carbon CSA Tensor in the Dipeptide AG.' By Nathan A. Oyler, John A. Stringer and Gary P. Drobny
6. Rocky Mountain Conference on NMR 1998: 'Experimental and simulated effects of insufficient proton decoupling on DRAWS dephasing curves'. by Nathan A. Oyler, John A. Stringer and Gary P. Drobny

Nathan A. Oyler

Professional References

Dr. Robert Tycko
Laboratory of Chemical Physics, NIDDK
National Institutes of Health
Building 5, Room 112
Bethesda, MD 20892-0520
Ph: 301-402-8272
Fax: 301-496-0825
e-mail: robertt@nidk.nih.gov

Dr. Gary Drobny
Department of Chemistry
University of Washington
Box 351700
Seattle, WA 98195-1700
Ph: 206-685-2052
Fax: 206-685-8665
e-mail: drobny@chem.washington.edu

Dr. Angel C. deDios
Department of Chemistry
Georgetown University
37th and O Streets NW
Washington, DC 20057-1227
Ph: 202-687-0670
Fax: 202-687-6209
e-mail: dediosa@georgetown.edu

Dr. Joanna R. Long
Department of Biochemistry & Molecular Biology
University of Florida
Box 100245
Gainesville, FL 32611-0245
Ph: 352-846-1506
Fax: 352-392-3422
e-mail: jrlong@mbi.ufl.edu