

## David P. Weliky

Professor, Department of Chemistry, Michigan State University, East Lansing, MI 48824-1322  
Phone: 517-353-1177 Fax: 517-353-1793 Email: [weliky@chemistry.msu.edu](mailto:weliky@chemistry.msu.edu)  
Web page: <http://www.chemistry.msu.edu/Faculty/Welikygrp/index.html>

**Research Interests:** Biological Solid-State NMR; Protein Structure Determination; Molecular Mechanisms of Membrane Fusion; Protein Structure in Cells.

**Teaching Interests:** Critical and Quantitative Thinking; Biophysical Chemistry; High-Resolution Spectroscopy in Undergraduate Education.

**Citizenship:** USA

### Education and Training:

B.A. with High Honors in Chemistry and Physics, Swarthmore College, Swarthmore, PA 1985.

Research Fellow, AT&T Bell Laboratories, Murray Hill, NJ, Summer 1992.

*Research:* 2D NMR Structure Determination of Organic Solids and Amorphous Polymers.

*Advisor:* Dr. Robert Tycko.

Ph.D. in Chemistry, The University of Chicago, Chicago, IL 1995.

*Ph.D. Thesis:* High-Resolution Laser Spectroscopy of Isotopic Impurity Vibrational Transitions in Solid Parahydrogen.

*Advisor:* Dr. Takeshi Oka.

Postdoctoral Research Fellow, National Institutes of Health, Bethesda, MD 1995 – 1997.

*Research:* Protein Structure Determination with Solid-State NMR Spectroscopy.

*Advisor:* Dr. Robert Tycko.

### Awards and Honors:

- Co-Organizer, Chicago Area NMR Discussion Group, East Lansing, MI, October 5, 2024.
- Co-Organizer, 4<sup>th</sup> Gateway NMR Conference, Ann Arbor, MI, September 21-22, 2019.
- Michigan State University College of Natural Science Meritorious Faculty Award, 2019.
- Guest Editor, Special NMR Issue of *Biochimica et Biophysica Acta – Biomembranes*, 2015.
- Editorial Board, *Solid State Nuclear Magnetic Resonance*, 2013 – 2017.
- Camille and Henry Dreyfus New Faculty Award, 1998.
- NIH Fellows Award for Research Excellence, 1996.
- AT&T Ph.D. Scholar, The University of Chicago, 1991-95.
- NSF Predoctoral Fellow, The University of Chicago, 1988-91.
- McCormick Fellow, The University of Chicago, 1987-91.
- Phi Beta Kappa, Swarthmore College, 1985.
- National Merit Scholar, Swarthmore College, 1981-85.

### Employment:

1985-87	Associate of the Technical Staff, The Aerospace Corporation, El Segundo, CA.
1987-95	Research and Teaching Assistant, The University of Chicago, Chicago, IL.
1995-97	Postdoctoral Research Fellow, National Institutes of Health, Bethesda, MD.
1998-2004	Assistant Professor, Department of Chemistry, Michigan State University, East Lansing, MI.
2004-2009	Associate Professor, Department of Chemistry, Michigan State University, East Lansing, MI.
2009-	Professor, Department of Chemistry, Michigan State University, East Lansing, MI.

### Publications:

1. Y. Zhang, S. D. Schmick, L. Xie, U. Ghosh, and D. P. Weliky, "Very Broad Distribution of  $\beta$  Sheet Registries of the HIV gp41 Fusion Peptide Supports Mutational Robustness for Fusion and Infection", *Proc. Natl. Acad. Sci. U.S.A.*, **50**, e2402953121 (2024).
2. Y. Zhang, U. Ghosh, L. Xie, D. Holmes, K. P. Severin, and D. P. Weliky, "Lipid Acyl Chain Protrusion Induced by the Influenza Virus Hemagglutinin Fusion Peptide Detected by NMR Paramagnetic Relaxation Enhancement", *Biophysical Chemistry*, **299**, 107028 (2023).
3. Md. Rokonujjaman, A. Sahyouni, R. Wolfe, L. Jia, U. Ghosh, and D. P. Weliky, "A Large HIV gp41 Construct with Trimer-of-Hairpins Structure Exhibits V2E Mutation-Dominant Attenuation of Vesicle Fusion and Helicity very similar to V2E attenuation of HIV Fusion and Infection and Supports: (1) Hairpin Stabilization of Membrane Apposition with Larger Distance for V2E; and (2) V2E dominance by an Antiparallel  $\beta$  sheet with Interleaved Fusion Peptide Strands from Two gp41 Trimers", *Biophysical Chemistry*, **203**, 106933 (2023).
4. U. Ghosh and D. P. Weliky, "Rapid  $^2\text{H}$  NMR Transverse Relaxation of Perdeuterated Lipid Acyl Chains of Membrane with Bound Viral Fusion Peptide Supports Large-Amplitude Motions of These Chains That Can Catalyze Membrane Fusion", *Biochemistry*, **60**, 2637-2651 (2021).
5. V. Jain, T. Shelby, T. Patel, E. Mekhedov, J. D. Petersen, J. Zimmerberg, A. Ranaweera, D. P. Weliky, P. Dandawate, S. Anant, S. Sulthana, Y. Vasquez, T. Banerjee, and S. Santra, "A Bimodal Nanosensor for Probing Influenza Fusion Protein Activity Using Magnetic Relaxation", *ACS Sensors*, **6**, 1899-1909 (2021).
6. U. Ghosh and D. P. Weliky, " $^2\text{H}$  Nuclear Magnetic Resonance Spectroscopy Supports Larger Amplitude Fast Motion and Interference with Lipid Chain Ordering for Membrane that Contains  $\beta$  Sheet Human Immunodeficiency Virus gp41 Fusion Peptide or Helical Hairpin Influenza Virus Hemagglutinin Fusion Peptide at Fusogenic pH", *Biochimica et Biophysica Acta - Biomembranes*, **1862**, 183404 (2020).
7. A. Ranaweera, P. U. Ratnayake, E. A. P. Ekanayaka, R. Declercq, and D. P. Weliky, "Hydrogen-Deuterium Exchange Supports Independent Membrane-Interfacial Fusion Peptide and Transmembrane Domains in Subunit 2 of Influenza Virus Hemagglutinin Protein, a Structured and Aqueous-Protected Connection between the Fusion Peptide and Soluble Ectodomain, and the Importance of Membrane Apposition by the Trimer-of-Hairpins Structure", *Biochemistry*, **58**, 2432-2466 (2019).
8. A. Ranaweera, P. U. Ratnayake, and D. P. Weliky, "The Stabilities of the Soluble Ectodomain and Fusion Peptide Hairpins of the Influenza Virus Hemagglutinin Subunit II Protein Are Positively Correlated with Membrane Fusion", *Biochemistry*, **57**, 5480-5493 (2018).
9. S. Liang, P. U. Ratnayake, C. Keinath, L. Jia, R. Wolfe, A. Ranaweera, and D. P. Weliky, "Efficient Fusion at Neutral pH by Human Immunodeficiency Virus gp41 Trimers Containing the Fusion Peptide and Transmembrane Domains", *Biochemistry*, **57**, 1219-1235 (2018).
10. P. N. Grenga, M. J. Nethercott, A. E. Mateo, M. Paternaude, T. Hoare, D. P. Weliky, and R. Priefer "Thermal and Spectral Analysis of Novel Amide-Tethered Polymers from Poly(allylamine)", *Australian Journal of Chemistry*, **69**, 458-466 (2016).
11. P. U. Ratnayake, E. A. Prabodha Ekanayaka, S. S. Komanduru, and D. P. Weliky, "Full-length Trimeric Influenza Virus Hemagglutinin II Membrane Fusion Protein and Shorter Constructs Lacking the Fusion Peptide or Transmembrane Domain: Hyperthermostability of the Full-Length Protein and the Soluble Ectodomain and Fusion Peptide Make Significant Contributions to Fusion of Membrane Vesicles", *Protein Expression and Purification*, **117**, 6-16 (2016).
12. U. Ghosh, L. Xie, L. Jia, S. Liang, and D. P. Weliky, "Close and Semiclosed Interhelical Structures in Membrane vs Closed and Open Structures in Detergent for the Influenza Virus Hemagglutinin Fusion Peptide and Correlation of Hydrophobic Surface Area with Fusion Catalysis", *Journal of the American Chemical Society*, **137**, 7548-7551 (2015).
13. D. P. Weliky, "A New Understanding of Antibiotic Action via Solid-State NMR of Cells with Uniform Isotopic Labeling", *Biophysical Journal*, **108**, 1314 (2015).
14. L. Jia, S. Liang, K. Sackett, L. Xie, U. Ghosh, and D. P. Weliky, "REDOR Solid-State NMR as a Probe of the Membrane Locations of Membrane-Associated Peptides and Proteins", *Journal of Magnetic Resonance*, **253**, 154-165 (2015).
15. L. Xie, L. Jia, S. Liang, and D. P. Weliky, "Multiple Locations of Peptides in the Hydrocarbon Core of Gel-Phase Membranes Revealed by Peptide  $^{13}\text{C}$  to Lipid  $^2\text{H}$  Rotational-Echo Double-Resonance Solid-State Nuclear Magnetic Resonance", *Biochemistry*, **54**, 677-684 (2015) – highlighted on *Biochemistry* website.
16. P. U. Ratnayake, K. Sackett, M. J. Nethercott, and D. P. Weliky, "pH-Dependent Vesicle Fusion Induced by the Ectodomain of the Human Immunodeficiency Virus Membrane Fusion Protein gp41: Two Kinetically Distinct

- Processes and Fully-Membrane-Associated gp41 with Predominant  $\beta$  sheet Fusion Peptide Conformation”, *Biochimica et Biophysica Acta*, **1848**, 289-298 (2015).
17. L. Cegelski and D. P. Weliky, “NMR Spectroscopy for Atomistic Views of Biomembranes and Cell Surfaces”, *Biochimica et Biophysica Acta*, **1848**, 201-202 (2015).
  18. K. Banerjee and D. P. Weliky, “Folded Monomers and Hexamers of the Ectodomain of the HIV gp41 Membrane Fusion Protein: Potential Roles in Fusion and Synergy Between the Fusion Peptide, Hairpin, and Membrane-Proximal External Region”, *Biochemistry*, **53**, 7184-7198 (2014).
  19. K. Sackett, M. J. Nethercott, Z. Zheng, and D. P. Weliky, “Solid-State NMR Spectroscopy of the HIV gp41 Membrane Fusion Protein Supports Intermolecular Antiparallel  $\beta$  Sheet Fusion Peptide Structure in the Final Six-Helix Bundle State”, *Journal of Molecular Biology*, **426**, 1077-1094 (2014) – highlighted by the journal in an issue devoted to Molecular Interplay in Viral Assembly.
  20. C. M. Gabrys, W. Qiang, Y. Sun, L. Xie, S. D. Schmick, and D. P. Weliky, “Solid-State Nuclear Magnetic Resonance Measurements of HIV Fusion Peptide  $^{13}\text{C}$  to Lipid  $^{31}\text{P}$  Proximities Support Similar Partially Inserted Membrane Locations of the  $\alpha$  Helical and  $\beta$  Sheet Peptide Structures”, *Journal of Physical Chemistry A*, **117**, 9848-9859 (2013).
  21. E. P. Vogel and D. P. Weliky, “Quantitation of Recombinant Protein in Whole Cells and Cell Extracts via Solid-State NMR Spectroscopy”, *Biochemistry*, **52**, 4285-4287 (2013) – highlighted on *Biochemistry* website.
  22. U. Ghosh, L. Xie, and D. P. Weliky, “Detection of Closed Influenza Virus Hemagglutinin Fusion Peptide Structures in Membranes by Backbone  $^{13}\text{C}$ - $^{15}\text{N}$  Rotational-Echo Double-Resonance Solid-State NMR”, *Journal of Biomolecular NMR*, **55**, 139-146 (2013).
  23. L. Xie, U. Ghosh, S. D. Schmick, and D. P. Weliky, “Residue-Specific Membrane Location of Peptides and Proteins Using Specifically and Extensively-Deuterated Lipids and Rotational-Echo Double-Resonance Solid-State NMR”, *Journal of Biomolecular NMR*, **55**, 11-17 (2013).
  24. E. P. Vogel, J. Curtis-Fisk, K. M. Young, and D. P. Weliky, “Solid-State Nuclear Magnetic Resonance (NMR) Spectroscopy of the Human Immunodeficiency Virus gp41 Protein that Includes the Fusion Peptide: NMR Detection of Recombinant Fgp41 in Inclusion Bodies in Whole Bacterial Cells and Structural Characterization of Purified and Membrane-Associated Fgp41”, *Biochemistry*, **50**, 10013-10026 (2011).
  25. K. Sackett, A. TerBush, and D. P. Weliky, “HIV gp41 Six-Helix Bundle Constructs Induce Rapid Vesicle Fusion at pH 3.5 and Little Fusion at pH 7.0: Understanding pH Dependence of Protein Aggregation, Membrane Binding, and Electrostatics, and Implications for HIV-Host Cell Fusion”, *European Biophysics Journal*, **40**, 489-502 (2011).
  26. S. D. Schmick and D. P. Weliky, “Major Antiparallel and Minor Parallel  $\beta$  sheet Populations Detected in the Membrane-Associated Human Immunodeficiency Virus Fusion Peptide”, *Biochemistry*, **49**, 10623-10635 (2010).
  27. S. Tristram-Nagle, R. Chan, E. Kooijman, P. Uppamoochikkal, W. Qiang, D. P. Weliky, and J. F. Nagle, “HIV Fusion Peptide Penetrates, Disorders, and Softens T-Cell Membrane Mimics”, *Journal of Molecular Biology*, **402**, 139-153 (2010).
  28. K. Sackett, M. J. Nethercott, R. F. Epand, R. M. Epand, D. R. Kindra, Y. Shai, and D. P. Weliky, “Comparative Analysis of Membrane-Associated Fusion Peptide Secondary Structure and Lipid Mixing Function of HIV Constructs that Model the Early Pre-Hairpin Intermediate and Final Hairpin Conformations”, *Journal of Molecular Biology*, **397**, 301-315 (2010).
  29. I. Chung, D. Holmes, D. P. Weliky, and M. G. Kanatzidis, “[ $\text{P}_3\text{Se}_7$ ] $^{3-}$ : A Phosphorus-Rich, Square-Ring Selenophosphate”, *Inorganic Chemistry*, **49**, 3092-3094 (2010).
  30. C. M. Gabrys, R. Yang, C. M. Wasniewski, J. Yang, C. G. Canlas, W. Qiang, Y. Sun, and D. P. Weliky, “Nuclear Magnetic Resonance Evidence for Retention of Lamellar Membrane Phase with Curvature in the Presence of Large Quantities of the HIV Fusion Peptide”, *Biochimica et Biophysica Acta*, **1798**, 194-201 (2010).
  31. N. Huarte, J. L. Nieva, S. Nir and D. P. Weliky, “Induced Perturbations and Adopted Conformations in Membranes by the HIV-1 Fusion Peptide”, In *Membrane-Active Peptides: Methods and Results on Structure and Function*, M. A. R. B. Castanho, Editor, International University Line:La Jolla, 2009, pp. 565-596.
  32. I. Chung, J.-H. Song, M. G. Kim, C. D. Malliakas, A. L. Karst, A. J. Freeman, D. P. Weliky, and M. G. Kanatzidis, “The Tellurophosphate  $\text{K}_4\text{P}_8\text{Te}_4$ : Phase-Change Properties, Exfoliation, Photoluminescence in Solution and Nanospheres”, *Journal of the American Chemical Society*, **131**, 16303-16312 (2009).
  33. Y. Sun and D. P. Weliky, “ $^{13}\text{C}$ - $^{13}\text{C}$  Correlation Spectroscopy of Membrane-Associated Influenza Virus Fusion Peptide Strongly Supports a Helix-Turn-Helix Motif and Two Turn Conformations”, *Journal of the American Chemical Society*, **131**, 13228-13229 (2009).
  34. W. Qiang, Y. Sun, and D. P. Weliky, “A Strong Correlation Between Fusogenicity and Membrane Insertion Depth of the HIV Fusion Peptide”, *Proceedings of the National Academy of Sciences of the U.S.A.*, **106**, 15314-15319 (2009).

35. K. Sackett, M. J. Nethercott, Y. Shai, and D. P. Weliky, "Hairpin Folding of HIV gp41 Abrogates Lipid Mixing Function at Physiologic pH and Inhibits Lipid Mixing by Exposed gp41 Constructs", *Biochemistry*, **48**, 2714-2722 (2009).
36. W. Qiang and D. P. Weliky, "HIV Fusion Peptide and its Cross-Linked Oligomers: Efficient Syntheses, Significance of the Trimer in Fusion Activity, Correlation of  $\beta$  Strand Conformation with Membrane Cholesterol, and Proximity to Lipid Headgroups", *Biochemistry*, **48**, 289-301 (2009).
37. J. Curtis-Fisk, R. M. Spencer, and D. P. Weliky, "Native Conformation at Specific Residues in Recombinant Inclusion Body Protein in Whole Cells Determined with Solid-State Nuclear Magnetic Resonance Spectroscopy", *Journal of the American Chemical Society*, **130**, 12568-12569 (2008) – featured in *Chemical & Engineering News*, **86**, 31 (2008).
38. J. Curtis-Fisk, R. M. Spencer, and D. P. Weliky, "Isotopically Labeled Expression in *E. coli*, Purification, and Refolding of the Full Ectodomain of the Influenza Virus Membrane Fusion Protein", *Protein Expression and Purification*, **61**, 212-219 (2008).
39. W. Qiang, M. L. Bodner, and D. P. Weliky, "Solid-State NMR Spectroscopy of HIV Fusion Peptides Associated with Host-Cell-Like Membranes: 2D Correlation Spectra and Distance Measurements Support a Fully Extended Conformation and Models for Specific Antiparallel Strand Registries", *Journal of the American Chemical Society*, **130**, 5459-5471 (2008).
40. M. A. Gave, K. M. Johnson, M. G. Kanatzidis, and D. P. Weliky, "Improved Resolution and Detection of  $^{31}\text{P}$ -Tl J-Couplings at 21 T in  $^{31}\text{P}$  Magic Angle Spinning Spectra of Inorganic Compounds Containing Tl/Bi/P/S", *Solid State Nuclear Magnetic Resonance*, **33**, 12-15 (2008).
41. M. L. Bodner, C. M. Gabrys, J. O. Struppe, and D. P. Weliky, " $^{13}\text{C}$ - $^{13}\text{C}$  and  $^{15}\text{N}$ - $^{13}\text{C}$  Correlation Spectroscopy of Membrane-Associated and Uniformly Labeled HIV and Influenza Fusion Peptides: Amino Acid-Type Assignments and Evidence for Multiple Conformations", *Journal of Chemical Physics*, **128**, 052319 (2008).
42. Z. Zheng, W. Qiang, and D. P. Weliky, "Investigation of Finite-Pulse Radiofrequency-Driven Recoupling Methods for Measurement of Intercarbonyl Distances in Polycrystalline and Membrane-Associated HIV Fusion Peptide Samples", *Magnetic Resonance in Chemistry*, **45**, S247-S260 (2007).
43. C. M. Gabrys and D. P. Weliky, "Chemical Shift Assignment and Structural Plasticity of a HIV Fusion Peptide Derivative in Dodecylphosphocholine Micelles", *Biochimica et Biophysica Acta-Biomembranes*, **1768**, 3225-3234 (2007).
44. M. A. Gave, D. P. Weliky, and M. G. Kanatzidis, "New Potassium Bismuth Thiophosphates Including the Modulated  $\text{K}_{1.5}\text{Bi}_{2.5}(\text{PS}_4)_3$ ", *Inorganic Chemistry*, **46**, 11063 -11074 (2007).
45. I. Chung, J. I. Jang, M. A. Gave, D. P. Weliky, and M. G. Kanatzidis, "Low Valent Phosphorus in the Molecular Anions  $[\text{P}_5\text{Se}_{12}]^{5-}$  and  $\beta$ - $[\text{P}_6\text{Se}_{12}]^{4-}$ : Phase Change Behavior and Near Infrared Second Harmonic Generation", *Chemical Communications*, 4998-5000 (2007).
46. I. Chung, C. D. Malliakas, J. I. Jang, C. G. Canlas, D. P. Weliky, and M. G. Kanatzidis, "Helical Polymer  $1/\infty[\text{P}_2\text{Se}_6]^{2-}$ : Strong Second Harmonic Generation Response and Phase-Change Properties of its K and Rb Salts", *Journal of the American Chemical Society*, **129**, 14996-15006 (2007).
47. M. A. Gave, C. G. Canlas, I. Chung, R. G. Iyer, M. G. Kanatzidis, and D. P. Weliky, " $\text{Cs}_4\text{P}_2\text{Se}_{10}$ : A New Compound Discovered with the Application of Solid State and High Temperature NMR", *Journal of Solid State Chemistry*, **180**, 2877-2884 (2007).
48. J. Curtis-Fisk, C. Preston, Z. Zheng, R. M. Worden, and D. P. Weliky, "Solid-State NMR Structural Measurements on the Membrane-Associated Influenza Fusion Protein Ectodomain", *Journal of the American Chemical Society*, **129**, 11320-11321 (2007).
49. M. A. Gave, C. D. Malliakas, D. P. Weliky, and M. G. Kanatzidis, "Wide Compositional and Structural Diversity in the System Tl/Bi/P/Q (Q = S, Se) and Observation of Vicinal P-Tl J Coupling in the Solid State", *Inorganic Chemistry*, **46**, 3632-3644 (2007).
50. W. Qiang, J. Yang, and D. P. Weliky, "Solid-State Nuclear Magnetic Resonance Measurements of HIV Fusion Peptide to Lipid Distances Reveal the Intimate Contact of  $\beta$  Strand Peptide with Membranes and the Proximity of the Ala-14-Gly-16 Region with Lipid Headgroups", *Biochemistry*, **46**, 4997-5008 (2007).
51. Z. Zheng, R. Yang, M. L. Bodner, and D. P. Weliky, "Conformational Flexibility and Strand Arrangements of the Membrane-Associated HIV Fusion Peptide Trimer Probed by Solid-State NMR Spectroscopy", *Biochemistry*, **45**, 12960-12975 (2006).
52. I. Chung, A. L. Karst, D. P. Weliky, and M. G. Kanatzidis, " $[\text{P}_6\text{Se}_{12}]^{4-}$ : A Phosphorus-Rich Selenophosphate with Low-Valent P Centers", *Inorganic Chemistry*, **45**, 2785-2787 (2006).

53. O. Palchik, R. G. Iyer, C. G. Canlas, D. P. Weliky, and M. G. Kanatzidis, "K<sub>10</sub>M<sub>4</sub>M'<sub>4</sub>S<sub>17</sub> (M = Mn, Fe, Co, Zn; M' = Sn, Ge) and Cs<sub>10</sub>Cd<sub>4</sub>Sn<sub>4</sub>S<sub>17</sub>: Compounds with a Discrete Supertetrahedral Cluster", *Z. Anorg. Allg. Chem.*, **630**, 2237-2247 (2004).
54. R. Yang, M. Prorok, F. J. Castellino, and D. P. Weliky, "A Trimeric HIV-1 Fusion Peptide Construct Which Does Not Self-Associate in Aqueous Solution and Which Has Fifteen-Fold Higher Membrane Fusion Rate", *Journal of the American Chemical Society*, **126**, 14722-14723 (2004).
55. C. M. Wasniewski, P. D. Parkanzky, M. L. Bodner, and D. P. Weliky, "Solid-State Nuclear Magnetic Resonance Studies of HIV and Influenza Fusion Peptide Orientations in Membrane Bilayers Using Stacked Glass Plate Samples", *Chemistry and Physics of Lipids*, **132**, 89-100 (2004).
56. J. Yang, M. Prorok, F. J. Castellino, and D. P. Weliky, "Oligomeric Beta Structure of the Membrane-Bound HIV-1 Fusion Peptide Formed From Soluble Monomers", *Biophysical Journal*, **87**, 1951-1963 (2004).
57. I. Chung, C. G. Canlas, D. P. Weliky, and M. G. Kanatzidis, "APSe<sub>6</sub> (A = K, Rb, and Cs): Polymeric Selenophosphates with Reversible Phase-Change Properties", *Inorganic Chemistry*, **43**, 2762-2764 (2004).
58. M. L. Bodner, C. M. Gabrys, P. D. Parkanzky, J. Yang, C. A. Duskin, and D. P. Weliky, "Temperature Dependence and Resonance Assignment of <sup>13</sup>C NMR Spectra of Selectively and Uniformly Labeled Fusion Peptides Associated with Membranes", *Magnetic Resonance in Chemistry*, **42**, 187-194 (2004).
59. R. J. DiCosty, D. P. Weliky, S. J. Anderson, and E. A. Paul, "<sup>15</sup>N-CPMAS Nuclear Magnetic Resonance Spectroscopy and Biological Stability of Soil Organic Nitrogen in Whole Soil and Particle-Size Fractions", *Organic Geochemistry*, **34**, 1635-1650 (2003).
60. J. Yang and D. P. Weliky, "Solid State Nuclear Magnetic Resonance Evidence for Parallel and Antiparallel Strand Arrangements in the Membrane-Associated HIV-1 Fusion Peptide", *Biochemistry*, **42**, 11879-11890 (2003).
61. C. G. Canlas, R. B. Muthukumar, M. G. Kanatzidis, and D. P. Weliky, "Investigation of Longitudinal <sup>31</sup>P Relaxation in Metal Selenophosphate Compounds", *Solid State Nuclear Magnetic Resonance*, **24**, 110-122 (2003).
62. C. G. Canlas, M. G. Kanatzidis, and D. P. Weliky, "<sup>31</sup>P Solid State NMR Studies of Metal Selenophosphates Containing [P<sub>2</sub>S<sub>6</sub>]<sup>4-</sup>, [P<sub>4</sub>S<sub>10</sub>]<sup>4-</sup>, [PSe<sub>4</sub>]<sup>3-</sup>, [P<sub>2</sub>Se<sub>7</sub>]<sup>4-</sup>, and [P<sub>2</sub>Se<sub>9</sub>]<sup>4-</sup> Ligands", *Inorganic Chemistry*, **42**, 3399-3405 (2003).
63. C. M. Gabrys, J. Yang, and D. P. Weliky, "Analysis of Local Conformation of Membrane-Bound and Polycrystalline Peptides by Two-Dimensional Slow-Spinning Rotor-Synchronized MAS Exchange Spectroscopy", *Journal of Biomolecular NMR*, **26**, 49-68 (2003).
64. R. Yang, J. Yang, and D. P. Weliky, "Synthesis, Enhanced Fusogenicity, and Solid State NMR Measurements of Cross-Linked HIV-1 Fusion Peptides", *Biochemistry*, **42**, 3527-3535 (2003).
65. J. Yang, P. D. Parkanzky, M. L. Bodner, C. G. Duskin, and D. P. Weliky, "Application of REDOR Subtraction for Filtered MAS Observation of Labeled Backbone Carbons of Membrane-Bound Fusion Peptides", *Journal of Magnetic Resonance*, **159**, 101-110 (2002).
66. K. K. Rangan, P. N. Trikalitis, C. Canlas, T. Bakas, D. P. Weliky, and M. G. Kanatzidis, "Hexagonal Pore Organization in Mesosstructured Metal Tin Sulfides Built with [Sn<sub>2</sub>S<sub>6</sub>]<sup>4-</sup> Clusters", *Nano Letters*, **2**, 513-517 (2002).
67. J. A. Aitken, C. Canlas, D. P. Weliky, and M. G. Kanatzidis, [P<sub>2</sub>S<sub>10</sub>]<sup>4-</sup>: A Novel Polythiophosphate Anion Containing a Tetrasulfide Fragment", *Inorganic Chemistry*, **40**, 6496-6498 (2001).
68. J. Yang, C. M. Gabrys, and D. P. Weliky, "Solid State Nuclear Magnetic Resonance Evidence for an Extended Beta Strand Conformation of the Membrane-Bound HIV-1 Fusion Peptide", *Biochemistry*, **40**, 8126-8137 (2001).
69. J. Yang, P. D. Parkanzky, B. A. Khunte, C. G. Canlas, R. Yang, C. M. Gabrys, and D. P. Weliky, "Solid State NMR Measurements of Conformation and Conformational Distributions in the Membrane-Bound HIV-1 Fusion Peptide", *Journal of Molecular Graphics and Modelling*, **19**, 129-135 (2001).
70. J.J. Balbach, J. Yang, D. P. Weliky, P. J. Steinbach, V. Tugarinov, J. Anglister, and R. Tycko, "Probing Hydrogen Bonds in the Antibody-Bound HIV-1 gp 120 V3 Loop by Solid State NMR REDOR Measurements", *Journal of Biomolecular NMR*, **16**, 313-327 (2000).
71. D. P. Weliky, A. E. Bennett, A. Zvi, J. Anglister, P. J. Steinbach, and R. Tycko, "Solid State NMR Evidence for an Antibody-Dependent Conformation of the V3 Loop of HIV-1 gp120", *Nature Structural Biology*, **6**, 141-145 (1999).
72. A. E. Bennett, D. P. Weliky, and R. Tycko, "Quantitative Conformational Measurements in Solid State NMR by Constant Time Homonuclear Dipolar Recoupling", *Journal of the American Chemical Society*, **120**, 4897-4898 (1998).
73. Y. Zhang, T. J. Byers, M.-C. Chan, K. E. Kerr, D. P. Weliky, and T. Oka, "High Resolution Infrared Spectroscopy of J=1 H<sub>2</sub> in Parahydrogen Crystals", *Physical Review B*, **58**, 218-233 (1998).
74. R. Tycko, D. P. Weliky, and A. E. Berger, "Investigation of Molecular Structure in Solids by Two-Dimensional NMR Exchange Spectroscopy with Magic Angle Spinning", *Journal of Chemical Physics*, **105**, 7915-7930 (1996).

75. D. P. Weliky and R. Tycko, "Determination of Peptide Conformations by Two-Dimensional Magic Angle Spinning NMR Exchange Spectroscopy with Rotor Synchronization", *Journal of the American Chemical Society*, **118**, 8487-8488 (1996).
76. D. P. Weliky, K. E. Kerr, T. Momose, T. Byers, Y. Zhang, and T. Oka, "High-Resolution Infrared Spectroscopy of Isotopic Impurity  $Q_1(0)$  Transitions in Solid Parahydrogen", *Journal of Chemical Physics*, **105**, 4461-4481 (1996).
77. D. P. Weliky, T. J. Byers, K. E. Kerr, T. Momose, R. Dickson, and T. Oka, "High-Resolution Laser Spectroscopy of the  $Q_{\nu}(0)$  Transitions in Solid Parahydrogen", *Applied Physics B*, **59**, 265-281 (1994).
78. K. E. Kerr, T. Momose, D. P. Weliky, C. M. Gabrys, and T. Oka, "Condon Modulation Spectroscopy of Solid Hydrogen and Measurement of the Temperature Dependence of the  $Q_1(0)$  Transition", *Physical Review Letters* **72**, 3957-3960 (1994).
79. G. Dabbagh, D. P. Weliky, and R. Tycko, "Determination of Monomer Conformations in Noncrystalline Solid Polymers by Two-Dimensional NMR Exchange Spectroscopy", *Macromolecules*, **27**, 6183-6191 (1994).
80. T. Momose, K. E. Kerr, D. P. Weliky, C. M. Gabrys, R. M. Dickson, and T. Oka, "Charge Induced  $H_2$  Spectrum in  $\gamma$ -Ray Irradiated para- $H_2$  Crystals", *Journal of Chemical Physics*, **100**, 7840-7843 (1994).
81. D. P. Weliky, G. Dabbagh, and R. Tycko, "Correlation of Chemical Bond Directions and Functional Group Orientations in Solids by Two-Dimensional NMR", *Journal of Magnetic Resonance A* **104**, 10-16 (1993).
82. T. Momose, D. P. Weliky, and T. Oka, "The Stimulated Raman Gain Spectrum of the  $Q_{1\leftarrow 0}(0)$  Transition of Solid Parahydrogen", *Journal of Molecular Spectroscopy* **153**, 760-761 (1992).
83. C. J. Pursell and D. P. Weliky, "Pure Rotational Transitions in the  $\nu_3$  State of Methane", *Journal of Molecular Spectroscopy*, **153**, 303-306 (1992).
84. C. J. Pursell and D. P. Weliky, "Infrared-Microwave Double Resonance Spectroscopy of  $CHF_3$  Using a Color Center Laser", *Journal of Molecular Spectroscopy*, **143**, 251-257 (1990).
85. C. J. Pursell, D. P. Weliky, and T. Oka, "Collision-Induced Double Resonance Studies of  $HN_2^+$  and HCN", *Journal of Chemical Physics*, **93**, 7041-7048 (1990).
86. W. C. Ho, C. J. Pursell, D. P. Weliky, K. Takagi, and T. Oka, "Infrared-Microwave Double Resonance Spectroscopy of Molecular Ions:  $HN_2^+$ ", *Journal of Chemical Physics*, **93**, 87-93 (1990).
87. C. J. Pursell, D. P. Weliky, W. C. Ho, K. Takagi, and T. Oka, "Observation of Direct and Collision-Induced Double Resonance of a Molecular Ion", *Journal of Chemical Physics*, **91**, 7997-7999 (1989).