

Vita of Jacob Schaefer
(born: 1938, San Francisco, California)

PRESENT POSITION:

Charles Allen Thomas Professor of Chemistry
Department of Chemistry
Washington University
St. Louis, MO 63130. Phone: 314-935-6844. email: schaefer@wuchem.wustl.edu

EDUCATION:

B.S. in Chemistry, Carnegie Institute of Technology, 1960
Ph.D. in Physical Chemistry, University of Minnesota, 1964

INDUSTRIAL EXPERIENCE:

1964 - 1974	Senior Research Chemist, Monsanto Company
1974 - 1980	Monsanto Fellow, Monsanto Company
1980 - 1986	Senior Monsanto Fellow, Monsanto Company
1986 - 1995	Consultant, Monsanto Company
1989 - 1992	Consultant, Battelle Pacific Northwest Laboratory
1991 - 1994	Consultant, Exxon Research and Engineering Company
1994 - 1996	Consultant, Procter & Gamble Company
1995 - 2004	Consultant, Berlex Biosciences

ACADEMIC APPOINTMENTS:

1978 - 1986	Adjunct Professor of Chemistry, Washington University
1986 -	Charles Allen Thomas Professor of Chemistry, Washington University

CURRENT RESEARCH INTERESTS:

Development of techniques for the nuclear magnetic resonance spectroscopy of solids (sensitivity enhancement, high resolution, relaxation), and the application of these techniques to the study of polymeric and biological solids.

PROFESSIONAL AWARDS AND RECOGNITION:

1977	St. Louis Section Award of the American Chemical Society
1980	Elected a Fellow in the American Physical Society
1982	Monsanto Science and Technology Award
1987	Midwest Award of the American Chemical Society
1993	Vaughan Lecturer, Rocky Mountain NMR Conference
1995	Chair, Magnetic Resonance Gordon Research Conference
2003	Laukien Prize of the Experimental NMR Conference
2007	Schulich Lecturer, Technion, Haifa, Israel

EDITORIAL BOARDS:

1981 - 1983	Macromolecules
1984 - 1986	Accounts of Chemical Research
1985 - 1996	Magnetic Resonance in Chemistry
2003-	Journal of Magnetic Resonance

CURRENT FUNDING:

1. "Glycopeptide Complexes with Bacterial Cell-Wall Proteins by REDOR NMR," NIH, 2015-2019, GM116130-21, \$350K/year.

PATENTS:

J. Schaefer and R. A. McKay, "Multi-Tuned Single Coil Transmission Line Probe for NMR Spectrometer, US Patent 5,861,748 (1999).

MINI-BIOGRAPHY

Jacob Schaefer is the Charles Allen Thomas Professor of Chemistry at Washington University. His speciality is high-resolution solid-state NMR. He is the co-inventor of cross-polarization magic-angle spinning (1976) and rotational-echo double resonance (1989). Both techniques have become standard methods and are currently in use world wide. His program has application areas focusing on the determination of structure and dynamics of protein binding sites, channels, and interfaces, and of chain packing and dynamics in synthetic polymer systems. All of these applications are on materials not suited to diffraction or solution-state NMR measurements.

PUBLICATIONS: (Papers which may be of special interest have titles in boldface.)

1. J. Schaefer
Random Monomer Distributions in Copolymers. Copolymerizations of
Ethylene-Vinyl Chloride and Ethylene-Vinyl Acetate
J. Phys. Chem., 70, 1975 (1966).
2. M. M. Kreevoy and J. Schaefer
Vicinal ^1H - ^{199}Hg Coupling Constants
J. Organomet. Chem., 6, 589 (1966).
3. R. J. Kern and J. Schaefer
On the Existence of a Free-Radical Organoboron Complex in the
Polymerization of Methyl Methacrylate
Polymer Letters, 5, 157 (1967).
4. R. J. Kern and J. Schaefer
Catalyst-Controlled Monomer Distributions in Copolymers.
Copolymerization of Propylene Oxide and Maleic Anhydride
J. Amer. Chem. Soc., 89, 6 (1967).
5. J. Schaefer and R. Yaris
On the Perturbation-Variation Calculation of Spin-Spin Coupling
Constants
J. Chem. Phys., 46, 948 (1967).
6. J. Schaefer and R. Yaris
A Phenomenological Treatment of the Absolute Signs of Spin-Spin
Coupling Constants
Chem. Phys. Letters, 1, 173 (1967).
7. J. Schaefer, R. J. Katnik, and R. J. Kern
The Monomer Distributions of Propylene Oxide-Maleic Anhydride
Copolymers
J. Amer. Chem. Soc., 90, 2476 (1968).
8. R. J. Katnik and J. Schaefer
Structural Isomer Distribution in Ring Polymers of Propylene Oxide
J. Org. Chem., 33, 384 (1968).
9. J. Schaefer, R. J. Katnik, and R. J. Kern
Structural Isomer Distribution in Linear Copolymers of Propylene Oxide
Macromolecules, 1, 101 (1968).
10. J. Schaefer, R. J. Kern, and R. J. Katnik
The Monomer Distributions of Propylene Oxide-Sulfur Dioxide Copolymers"
Macromolecules, 1, 107 (1968).
11. J. Schaefer

- Equilibrium of Catalytic States in the Copolymerization of Propylene Oxide and Sulfur Dioxide
Macromolecules, 1, 111 (1968).
12. J. Schaefer and J. M. S. Henis
Electron Density Rearrangement Description of Ion-Molecule Reactions
J. Chem. Phys., 49, 5377 (1968).
 13. J. Schaefer
Conformations of *cis*- and *trans*-2,5-Diphenyl-1,4-dioxanes
J. Org. Chem., 33, 4558 (1968).
 14. A. G. Hortmann, D. S. Daniel, and J. Schaefer
Determination of the Configuration and Conformation of Gamma-Metasantonin
J. Org. Chem., 33, 3988 (1968).
 15. J. Schaefer, D. A. Bude, and R. J. Katnik
Non-Markoffian Monomer Distributions in Copolymers.
The Copolymerization of Ethylene Oxide and Maleic Anhydride
Macromolecules, 2, 289 (1969).
 16. J. Schaefer
Carbon-13 Nuclear Magnetic Resonance Analysis of Ethylene Oxide-Maleic Anhydride Copolymers
Macromolecules, 2, 210 (1969).
 17. J. Schaefer
Carbon-13 Nuclear Magnetic Resonance Analysis of Poly(propylene oxide)
Macromolecules, 2, 533 (1969).
 18. J. Schaefer and J. M. S. Henis
Dependence of Ion-Molecule Reaction Cross Section on Internal Energy
J. Chem. Phys., 51, 4671 (1969).
 19. J. Schaefer and R. Yaris
Random Matrix Theory and Nuclear Magnetic Resonance Spectral Distributions
J. Chem. Phys., 51, 4469 (1969).
 20. J. Schaefer
High-Resolution Pulsed Carbon-13 NMR Analysis of Some Polyelectrolytes
Macromolecules, 4, 98 (1971).
 21. J. Schaefer
High-Resolution Pulsed Carbon-13 NMR Analysis of Polyacrylonitrile
Macromolecules, 4, 105 (1971).

22. J. Schaefer
High-Resolution Pulsed Carbon-13 NMR Analysis of the Monomer
Distribution in Styrene-Acrylonitrile Copolymers
Macromolecules, 4, 107 (1971).
23. J. Schaefer
High-Resolution Pulsed Carbon-13 NMR Analysis of Some Polymeric Gels
Macromolecules, 4, 110 (1971).
24. J. C. Duggan, W. H. Urry, and J. Schaefer
Carbon-13 Pseudo-Contact Shifts in Structure Determination: The
Hemiketal Dimer from 2-Hydroxy-2-Methylcyclobutanone
Tetrahedron Letters, 44, 4197 (1971).
25. J. Schaefer
Selective Saturation of Carbon-13 Lines in Carbon-13
Fourier Transform NMR Experiments
J. Mag. Res., 6, 670 (1972).
26. J. Schaefer and D. F. S. Natusch
Carbon-13 Overhauser Effect in Polymer Solutions
Macromolecules, 5, 416 (1972).
27. J. Schaefer
Comparisons of the Carbon-13 Nuclear Magnetic Resonance Spectra
of Some Solid *cis*- and *trans*-Polyisoprenes
Macromolecules, 5, 427 (1972).
28. J. Schaefer
Use of Noise-Modulated Partial Decoupling in the Interpretation
of the Carbon-13 Nuclear Magnetic Resonance Spectra of Polymers
Macromolecules, 5, 590 (1972).
29. J. Schaefer, S. H. Chin, and S. I. Weissman
**Magic-Angle Carbon-13 Nuclear Magnetic Resonance Spectra of
Filled Rubber**
Macromolecules, 5, 798 (1972).
30. J. Schaefer
Distributions of Correlation Times and the Carbon-13
Nuclear Magnetic Resonance Spectra of Polymers
Macromolecules, 6, 882 (1973).
31. E. O. Stejskal and J. Schaefer
Data Routing in Quadrature FT NMR
J. Magn. Reson., 13, 249 (1974).

32. E. O. Stejskal and J. Schaefer
Comparisons of Quadrature and Single-Phase Fourier Transfer NMR
J. Magn. Reson., 14, 160 (1974).
33. J. Schaefer and E. O. Stejskal
Baseline Artifacts in High-Resolution Fourier Transform NMR Spectra
J. Magn. Reson., 15, 173 (1974).
34. J. Schaefer and E. O. Stejskal
Carbon-13 Nuclear Magnetic Resonance Measurement of Oil Composition in Single Viable Soybeans
J. Am. Oil. Chem. Soc., 51, 210 (1974).
35. J. Schaefer and E. O. Stejskal
Determination of Oil, Starch, and Protein Content of Viable Intact Seeds by Carbon-13 Nuclear Magnetic Resonance
J. Am. Oil. Chem. Soc., 51, 562 (1974).
36. E. O. Stejskal and J. Schaefer
Carbon-13 Nuclear Magnetic Resonance Characterization of Heterogeneous Sequence Distributions in Styrene-Acrylonitrile Copolymers
Macromolecules, 7, 14 (1974).
37. E. O. Stejskal and J. Schaefer
Carbon-13 Nuclear Magnetic Resonance Study of the Separation of Styrene from Ethylbenzene by Dense Polymer Films
Macromolecules, 7, 767 (1974).
38. E. O. Stejskal, J. Schaefer, J. M. S. Henis, and M. K. Tripodi
Magic-Angle Carbon-13 NMR Study of CO₂ Adsorbed on Some Molecular Sieves
J. Chem. Phys., 61, 2351 (1974).
39. J. Schaefer
The Carbon-13 NMR Analysis of Synthetic High Polymers
in *Topics in Carbon-13 NMR Spectroscopy*, (G.C. Levy, editor), John Wiley, 1974, p. 149.
40. J. Schaefer, E. O. Stejskal, and R. Buchdahl
High-Resolution Carbon-13 Nuclear Magnetic Resonance Study of Some Solid Glassy Polymers
Macromolecules, 8, 291 (1975).
41. E. O. Stejskal and J. Schaefer
Removal of Artifacts From Cross-Polarization NMR Experiments
J. Magn. Reson., 18, 560 (1975).

42. J. Schaefer and E. O. Stejskal
Carbon-13 Nuclear Magnetic Resonance Analysis of Intact Oilseeds
J. Am. Oil Chem. Soc., 52, 366 (1975).
43. J. Schaefer, E. O. Stejskal, and C. F. Beard
Carbon-13 Nuclear Magnetic Resonance Analysis of Metabolism in Soybeans
Labeled by $^{13}\text{CO}_2$
Plant Physiol., 55, 1048 (1975).
44. J. Schaefer and E. O. Stejskal
**Carbon-13 Nuclear Magnetic Resonance of Polymers Spinning
at the Magic Angle**
J. Am. Chem. Soc., 98, 1031 (1976).
45. J. Schaefer
The Analysis of ^{13}C NMR Relaxation Experiments in Polymers
in *The Investigation of the Structure of Macromolecules by Spectroscopic Methods*, (K.J. Ivin,
editor), John Wiley, 1976, p. 201.
46. M. D. Sefcik, J. Schaefer, and E. O. Stejskal
Characterization of the Mordenite Sorption Sites by Carbon-13 NMR
in *Molecular Sieves II*, (J.R. Katzer, editor), American Chemical Society, 1977, p. 344.
47. E. O. Stejskal, J. Schaefer, and R. A. McKay
High-Resolution, Slow-Spinning Magic-Angle Carbon-13 NMR
J. Magn. Reson., 25, 569 (1977).
48. M. L. Rueppel, B. B. Brightwell, J. Schaefer, and J. T. Marvel
Metabolism and Degradation of Glyphosate in Soil and Water
Ag. Food Chem., 25, 517 (1977).
49. M. D. Sefcik, J. Schaefer, and E. O. Stejskal
Characterization of the Small-Port Mordenite Adsorption
Sites by C-13 NMR
ACS Symp. Series, 34, 109 (1977).
50. E. O. Stejskal, J. Schaefer, and J. S. Waugh
Magic-Angle Spinning and Polarization Transfer in Proton-Enhanced NMR
J. Magn. Reson., 28, 105 (1977).
51. J. Schaefer, E. O. Stejskal, and R. Buchdahl
Magic-Angle ^{13}C NMR Analysis of Motion in Solid Glassy Polymers
Macromolecules, 10, 384 (1977).
52. V. J. Bartuska, G. E. Maciel, J. Schaefer, and E. O. Stejskal
Prospects for Carbon-13 Nuclear Magnetic Resonance Analysis
of Solid Fossil Fuel Materials

- Fuel, 56, 354 (1977).
53. J. Schaefer, E. O. Stejskal, and R. Buchdahl
Magic-Angle ^{13}C NMR Analysis of Motion in Solid Polycarbonate
J. Macromol. Sci.-Phys., B13, 665 (1977).
 54. J. Schaefer, E. O. Stejskal, C. F. Brewer, H. D. Keiser,
and H. Sternlicht
Cross Polarization ^{13}C Nuclear Magnetic Resonance Spectroscopy
of Collagen
Arch. Biochem. Biophys., 190, 657 (1978).
 55. J. Schaefer
High-Resolution C-13 NMR Studies of Solid Polymers
in *Molecular Basis of Transitions and Relaxations*, (Dale J. Meier, editor), Midland
Macromolecular Monographs, Volume 4, Gordon and Breach Science Publishers, 1978, p. 103.
 56. T. R. Steger, E. O. Stejskal, R. A. McKay, B. Ray Stults, and J. Schaefer
Magic-Angle C-13 NMR Conformational Analysis of
1,3,5-trimethoxybenzene
Tetrahedron Letters, 295 (1979).
 57. J. Schaefer, E. O. Stejskal, and R. A. McKay
Cross-Polarization NMR of N-15 Labeled Soybeans
BBRC, 88, 274 (1979).
 58. J. Schaefer, R. A. McKay, and E. O. Stejskal
Double-Cross Polarization NMR of Solids
J. Magn. Reson., 34, 443 (1979).
 59. M. D. Sefcik, E. O. Stejskal, R. A. McKay, and J. Schaefer
Investigation of the Structure of Acetylene-Terminated Polyimide
Resins Using Magic-Angle Carbon-13 Nuclear Magnetic Resonance
Macromolecules, 12, 423 (1979).
 60. J. Schaefer and E. O. Stejskal
High-Resolution ^{13}C NMR of Solid Polymers
in *Topics in Carbon-13 NMR Spectroscopy*, Vol. 3 (G.C. Levy, editor), John Wiley, 1979, p. 283.
 61. T. R. Steger, J. Schaefer, E. O. Stejskal, R. A. McKay, and M. D. Sefcik
High-Resolution Solid-State NMR of Glasses
Ann. N.Y. Acad. Sci. 371, 106 (1981).
 62. E. O. Stejskal, J. Schaefer, and T. R. Steger
High-Resolution ^{13}C Nuclear Magnetic Resonance in Solids
Faraday Symp., 13, 56 (1979).

63. J. Schaefer, L. D. Kier, and E. O. Stejskal
**Characterization of Photorespiration in Intact Leaves
Using ¹³C Carbon Dioxide Labeling**
Plant Physiol., 65, 254 (1980).
64. J. Schaefer, E. O. Stejskal, T. R. Steger, M. D. Sefcik, and R. A. McKay
Carbon-13 T_{1ρ} Experiments on Solid Glassy Polymers
Macromolecules, 13, 1121 (1980).
65. T. R. Steger, J. Schaefer, E. O. Stejskal, and R. A. McKay
Molecular Motion in Polycarbonate and Modified Polycarbonates
Macromolecules, 13, 1127 (1980).
66. M. D. Sefcik, J. Schaefer, E. O. Stejskal, and R. A. McKay
Analysis of the Room-Temperature Molecular Motions
of Poly(ethylene terephthalate)
Macromolecules, 13, 1132 (1980).
67. G. S. Jacob, J. Schaefer, E. O. Stejskal, and R. A. McKay
Magic-Angle N-15 NMR Study of Nitrate Metabolism of *Neurospora crassa*
BBRC, 97, 1176 (1980).
68. J. Schaefer, M. D. Sefcik, E. O. Stejskal, and R. A. McKay
Magic-Angle Carbon-13 NMR Analysis of the Interface Between Phases in a
Blend of Polystyrene with a Polystyrene-Polybutadiene Block Copolymer
Macromolecules, 14, 188 (1981).
69. T. J. Sanford, R. D. Allendoerfer, E. T. Kang, P. Ehrlich, and J. Schaefer
Magic-Angle C-13 NMR of Solid Polyphenylacetylenes
J. Poly. Sci. Physics, 19, 1151 (1981).
70. J. Schaefer, E. O. Stejskal, M. D. Sefcik, and R. A. MacKay
Applications of High Resolution C-13 and N-15 NMR of Solids
Phil. Trans. R. Soc. Lond. A. 299, 593 (1981).
71. E. O. Stejskal, J. Schaefer, M. D. Sefcik, and R. A. McKay
Magic-Angle C-13 NMR Study of the Compatibility of
Solid Polymeric Blends
Macromolecules, 14, 275 (1981).
72. J. Schaefer, M. D. Sefcik, E. O. Stejskal, and R. A. McKay
Separated Local Fields in Polymers by Magic-Angle C-13 NMR"
Macromolecules, 14, 280 (1981)
73. J. Schaefer, M. D. Sefcik, E. O. Stejskal, R. A. McKay, and P. L. Hall
Characterization of the Catabolic Transformation of Lignin
in Culture Using Magic-Angle C-13 NMR

- Macromolecules, 14, 557 (1981).
74. W. T. Dixon, J. Schaefer, M. D. Sefcik, E. O. Stejskal, and R. A. McKay
Quantitative Chemical Composition of Materials Such as Humic Soils,
Lignins, and Coals by High-Resolution C-13 NMR
J. Magn. Reson., 45, 173 (1981).
 75. J. Schaefer, T. A. Skokut, E. O. Stejskal, R. A. McKay, and J. E. Varner
Estimation of Protein Turnover Using Magic Angle Double Cross
Polarization N-15 NMR
J. Biol. Chem., 256, 11574 (1981).
 76. J. Schaefer, T. A. Skokut, E. O. Stejskal, R. A. McKay, and J. E. Varner
"Asparagine Amide Metabolism in Developing Cotyledons of Soybean"
Proc. Natl. Acad. Sci. USA, 78, 5978 (1981).
 77. L. C. Damude, P. A. W. Dean, M. D. Sefcik, and J. Schaefer
The Solid State Structure of Arene-Mercury(II) Complexes from
Magic-Angle Spinning C-13 NMR
J. Organomet. Chem., 226, (1982).
 78. T. A. Skokut, J. E. Varner, J. Schaefer, E. O. Stejskal, and R. A. McKay
N-15 NMR Determination of Asparagine and Glutamine
Nitrogen Utilization for Synthesis of Storage
Protein in Developing Cotyledons of Soybean in Culture
Plant. Physiol., 69, 308 (1982).
 79. T. A. Skokut, J. E. Varner, J. Schaefer, E. O. Stejskal, and R. A. McKay
N-15 and C-13 NMR Determination of Utilization of Glycine in
Developing Cotyledons of Soybean
Plant Physiol., 69, 314 (1982).
 80. E. O. Stejskal, J. Schaefer, M. D. Sefcik, G. S. Jacob, and R. A. McKay
Magic-Angle NMR Studies of Polymers
Pure and Applied Chem., 54, 461 (1982).
 81. J. Schaefer, E. O. Stejskal, G. S. Jacob, and R. A. McKay
Natural Abundance N-15 NMR Study of the Solids from the
Reaction of HCN and Ammonia
Applied Spec., 36, 179 (1982).
 82. J. Schaefer, E. O. Stejskal, and R. A. McKay
Chemical Bond Labeling and Double Cross-Polarization NMR
ACS Symp. Series, 191, 187 (1982).
 83. W. T. Dixon, J. Schaefer, M. D. Sefcik, E. O. Stejskal, and R. A. McKay
Total Suppression of Sidebands in CPMAS C-13 NMR

- J. Magn. Reson., 49, 341 (1982).
84. J. Schaefer, R. A. McKay, E. O. Stejskal, and W. T. Dixon
Dipolar Rotational Spin-Echo ^{13}C NMR of Polymers
J. Magn. Reson. 52, 123 (1983).
85. M. D. Sefcik, J. Schaefer, E. O. Stejskal, R. A. McKay, J. F. Ellena, S. W. Dodd, and M. F. Brown
Lipid Bilayer Dynamics and Rhodopsin-Lipid Interactions
BBRC 114, 1048 (1983).
86. M. D. Sefcik, J. Schaefer, F. L. May, D. Raucher, and S. M. Dub
Diffusivity of Gases and Main-Chain Cooperative Motions in
Plasticized Poly(vinyl Chloride)
J. Poly. Sci. Physics 21, 1041 (1983).
87. M. D. Sefcik and J. Schaefer
Solid-State ^{13}C NMR Evidence for Gas-Polymer Interactions in the
Carbon Dioxide-Poly(vinyl Chloride) System
J. Poly. Sci. Physics 21, 1055 (1983).
88. G. S. Jacob, J. Schaefer, and G. E. Wilson, Jr.
Direct Measurement of Peptidoglycan Cross-linking in
Bacteria by ^{15}N NMR
J. Biol. Chem., 258, 10824 (1983).
89. J. Schaefer, M. D. Sefcik, E. O. Stejskal, R. A. McKay, W. T. Dixon and R. E. Cais
Molecular Motion in Glassy Polystyrenes
ACS Symp. 247, 43 (1984).
90. J. Schaefer, E. O. Stejskal, R. A. McKay, and W. T. Dixon
Phenylalanine Ring Dynamics by Solid-State ^{13}C NMR
J. Magn. Reson. 57, 85 (1984).
91. J. Schaefer, M. D. Sefcik, E. O. Stejskal, R. A. McKay, W. T. Dixon and R. E. Cais
Molecular Motion in Glassy Polystyrenes
Macromolecules 17, 1107 (1984).
92. J. Schaefer, M. D. Sefcik, E. O. Stejskal, and R. A. McKay
Carbon-13 $T_{1\rho}$ Experiments on Solid Polymers Having Tightly
Spin-Coupled Protons
Macromolecules 17, 1118 (1984).
93. R. A. McKay, J. Schaefer, E. O. Stejskal, R. Ludicky, and C. N. Matthews
Double-Cross Polarization Detection of Labeled Chemical Bonds
in HCN Polymerization
Macromolecules 17, 1124 (1984).

94. E. O. Stejskal, J. Schaefer, and R. A. McKay
Analysis of Double-Cross Polarization Rates in Solid Proteins
J. Magn. Reson. 57, 471 (1984).
95. J. Schaefer, E. O. Stejskal, J. R. Garbow, and R. A. McKay
Quantitative Determination of the Concentrations
of ^{13}C - ^{15}N Chemical Bonds by Double Cross-Polarization NMR
J. Magn. Reson. 59, 150 (1984).
96. J. Schaefer, E. O. Stejskal, R. A. McKay, and W. T. Dixon
Molecular Motion in Polycarbonates by Dipolar Rotational
Spin-Echo ^{13}C NMR
Macromolecules 17, 1479 (1984).
97. C. N. Matthews, R. Ludicky, J. Schaefer, E. O. Stejskal, and R. A. McKay
Heteropolypeptide From Hydrogen Cyanide and Water?
Solid State ^{15}N NMR Investigations
Origins of Life 14, 243 (1984).
98. J. Skolnick, D. Perchak, R. Yaris, and J. Schaefer
Phenomenological Model of the Stress-Strain Behavior of
Glassy Polymers
Macromolecules 17, 2332 (1984).
99. G. E. Wilson, Jr., G. S. Jacob, and J. Schaefer
Solid-State N-15 NMR Studies of the Effects of
Penicillin on Cell-Wall Metabolism of *Aerococcus viridans*
BBRC, 126, 1006 (1985).
100. G. T. Coker and J. Schaefer
N-15 and C-13 NMR Determination of Allantoin Metabolism
in Developing Soybean Cotyledons
Plant Physiol. 77, 129 (1985).
101. G. S. Jacob, J. Schaefer, and G.E. Wilson, Jr.
Solid-State C-13 and N-15 NMR Studies of Alanine Metabolism
in *Aerococcus viridans*
J. Biol. Chem. 260, 2777 (1985).
102. J. Schaefer, E. O. Stejskal, D. Perchak, J. Skolnick, and R. Yaris
Molecular Mechanism of the Ring-Flip Process in Polycarbonate
Macromolecules 18, 368 (1985).
103. J. Mason, D. M. P. Mingos, J. Schaefer, D. Sherman, and E. O. Stejskal
N-15 NMR Characterization of Bent and Linear Nitrosyl Ligands in the
Solid State by Cross-polarization Magic-angle-spinning Spectroscopy of
Complexes of Ruthenium

- J. Chem. Soc., Chem. Commun. 444 (1985).
104. G. S. Jacob, J. Schaefer, E. O. Stejskal and R. A. McKay
**Solid-State NMR Determination of Glyphosate Metabolism in
a *Pseudomonas* sp.**
J. Biol. Chem., 260, 5899 (1985).
105. J. Schaefer
Characterization of Solid Polymers by Carbon-13 NMR
in *New Direction in Chemical Analysis*, (B.L. Shapiro, editor),
Texas A & M University Press, 1985, p. 396.
106. T. A. Skokut, J. Manchester and J. Schaefer
Stimulation of Somatic Embryo Production by Amino Acids
and N-15 NMR Determination of Nitrogen Utilization
Plant Physiol., 79, 579 (1985).
107. J. Schaefer
Characterization of Intracellular pH During Somatic
Embryo Production by Solid-State P-31 NMR
Plant Physiol., 79, 584 (1985).
108. J. Schaefer, J. R. Garbow, G. S. Jacob, T. M. Forrest
and G. E. Wilson, Jr.
Characterization of Peptidoglycan Stem Lengths by
Solid-State ¹³C and ¹⁵N NMR
BBRC, 137, 736 (1986).
109. T. Fukamizo, K. J. Kramer, D. D. Mueller, J. Schaefer, J. R. Garbow
and G. S. Jacob
Analysis of Chitin Structure by NMR Spectroscopy and
Chitinolytic Enzyme Digestion
Arch. Biochem. Biophys., 249, 15 (1986).
110. G. S. Jacob, J. R. Garbow, and J. Schaefer
Direct Measurement of Poly(β -Hydroxybutyrate) in
a Pseudomonad by Solid-State ¹³C NMR
J. Biol. Chem., 261, 16785 (1986).
111. J. R. Garbow, J. Schaefer, R. Ludicky, and C. N. Matthews
Detection of Secondary Amides in HCN Polymers by
Dipolar Rotational Spin-Echo N-15 NMR
Macromolecules, 20, 305 (1987).
112. J. R. Garbow and J. Schaefer
The Effect of Annealing on the Main-Chain Motions of
Poly(butylene terephthalate)

- Macromolecules, 20, 819 (1987).
113. J. Schaefer, K.J. Kramer, J.R. Garbow, G.S. Jacob, E.O. Stejskal, T.L. Hopkins, and R.D. Speirs
Aromatic Cross-Links in Insect Cuticle: Detection by Solid State ^{13}C and ^{15}N NMR
Science, 235, 1200 (1987).
 114. G. S. Jacob, J. Schaefer, J. R. Garbow, and E. O. Stejskal
Solid-State NMR Studies of *Klebsiella pneumoniae*
Grown Under Nitrogen-Fixing Conditions
J. Biol. Chem., 262, 254 (1987).
 115. G. S. Jacob, J. R. Garbow, J. Schaefer, and G. M. Kishore
Solid-State NMR Studies of Regulation of Glyphosate
and Glycine Metabolism in *Pseudomonas sp.* Strain PG2982
J. Biol. Chem., 262, 1552 (1987).
 116. G. T. Coker and J. Schaefer
 ^{15}N and ^{13}C NMR Determination of Methionine Metabolism in
Developing Soybean Cotyledons
Plant Physiol., 83, 698 (1987).
 117. K. J. Kramer, T. L. Hopkins, J. Schaefer, T. D. Morgan,
J. R. Garbow, G. S. Jacob, E. O. Stejskal, and R. D. Speirs
Mechanisms of Insect Cuticle Stabilization
in *Molecular Entomology*, (J.H. Law, ed.) Alan R. Liss, Inc., 1987, p. 331.
 118. R. Pipke, N. Amrhein, G. S. Jacob, J. Schaefer and G. M. Kishore
Metabolism of Glyphosate in an *Arthrobacter sp.* GLP-1
European J. Biochem., 165, 267 (1987).
 119. J. Schaefer, J. R. Garbow, E. O. Stejskal, and J. A. Lefelar
Plasticization of Polybutyral-Co-(Vinyl Alcohol)
Macromolecules 20, 1271 (1987).
 120. V. Bork and J. Schaefer
Measuring ^{13}C - ^{13}C Connectivity in Spinning Solids
by Selective Excitation
J. Magn. Reson. 78, 348 (1988).
 121. R. J. Auchus, D. F. Covey, V. Bork, and J. Schaefer
Solid-State NMR Observation of Cysteine and
Lysine Michael Adducts of Inactivated Estradiol Dehydrogenase
J. Biol. Chem. 263, 11640 (1988).
 122. K. J. Kramer, T. L. Hopkins, and J. Schaefer

- Insect Cuticle Structure and Metabolism
ACS Symp. Series 379, 160 (1988).
123. T. Gullion, M. D. Poliks, and J. Schaefer
Extended Dipolar Modulation and Magic-Angle Spinning
J. Magn. Reson. 80, 553 (1988).
124. G. S. Jacob, J. R. Garbow, L. E. Hallas, N. M. Kimack,
G.M. Kishore, and J. Schaefer
Metabolism of Glyphosate in *Pseudomonas sp.* Strain LBr
App. Environ. Microbiol. 54, 2953 (1988).
125. T. Gullion and J. Schaefer
Rotational-Echo Double-Resonance NMR
J. Magn. Reson. 81, 196 (1989).
126. J. R. Garbow, G. S. Jacob, E. O. Stejskal, and J. Schaefer
Protein Dynamics from Chemical Shift and Dipolar Rotational
Spin-Echo ¹⁵N NMR
Biochemistry 28, 1362 (1989).
127. K. J. Kramer, V. Bork, J. Schaefer, T. D. Morgan, and T. L. Hopkins
Solid State ¹³C NMR and Chemical Analyses of Insect
Non-cuticular Sclerotized Support Structures
Insect Biochem. 19, 69 (1989).
128. T. Gullion and J. Schaefer
Detection of Weak Heteronuclear Dipolar Coupling
by Rotational-Echo Double-Resonance NMR
Adv. Magn. Reson. 13, 57 (1989).
129. G. T. Coker and J. Schaefer
Probing Metabolism with Double-Cross Polarization Solid-State NMR
in *Nuclear Magnetic Resonance in Agriculture*, (P. E. Pfeffer and W. V. Gerasimowicz, eds.),
CRC Press, 1989, p. 371.
130. T. Gullion and J. Schaefer
Comment on "Carbon-13 Relaxation and Molecular Motion in
Glassy Bisphenol-A Polycarbonate
J. Chem. Phys. 91, 7307 (1989).
131. K. J. Kramer, T. D. Morgan, T. L. Hopkins, A. M. Christensen, and J. Schaefer
Solid-State ¹³C NMR and Diphenol Analyses of Sclerotized
Cuticles from Store Product Coleoptera
Insect Biochem. 19, 753 (1989).
132. J. H. Walton, M. J. Lizak, M. S. Conradi, T. Gullion, and J. Schaefer

- Hydrostatic Pressure Dependence of Molecular Motions in Polycarbonates
Macromolecules 23, 416 (1990).
133. G. R. Marshall, D. D. Beusen, K. Kociolek, A. S. Redlinski, M. T. Leplawy, Y. Pan, and J. Schaefer
Determination of a Precise Interatomic Distance in a Helical Peptide by REDOR NMR
J. Am. Chem. Soc. 112, 963 (1990).
134. M. D. Poliks, T. Gullion, and J. Schaefer
Main-Chain Reorientation in Polycarbonates
Macromolecules 23, 2678 (1990).
135. M. D. Poliks and J. Schaefer
Microscopic Dynamics in Chloral Polycarbonate by CPMAS ^{13}C NMR
Macromolecules 23, 2682 (1990).
136. M. D. Poliks and J. Schaefer
Characterization of the Chain Dynamics of PEEK by ^{13}C NMR
Macromolecules 23, 3426 (1990).
137. V. Bork, T. Gullion, A. Hing, and J. Schaefer
Measurement of ^{13}C - ^{15}N Coupling by Dipolar-Rotational Spin-Echo NMR
J. Magn. Reson. 88, 523 (1990).
138. S. M. Holl, R. A. McKay, T. Gullion, and J. Schaefer
Rotational-Echo Triple-Resonance NMR
J. Magn. Reson. 89, 620 (1990).
139. Y. Pan, T. Gullion, and J. Schaefer
Determination of C-N Internuclear Distances by Rotational-Echo
Double-Resonance NMR of Solids
J. Magn. Reson. 90, 330 (1990).
140. Y. Pan and J. Schaefer
DANTE-Selected Rotational-Echo Double-Resonance NMR
J. Magn. Reson. 90, 341 (1990).
141. K. J. Kramer, T. D. Morgan, T. L. Hopkins, A. Christensen, and J. Schaefer
Insect Cuticle Tanning
ACS Symp. 449, 87 (1991).
142. T. Gullion and J. Schaefer
Elimination of Resonance Offset Effects in Rotational-Echo
Double-Resonance NMR
J. Magn. Reson. 92, 439 (1991).
143. K. J. Kramer, A. M. Christensen, T. D. Morgan, J. Schaefer, T. H. Czapla, and T. L. Hopkins

- Analysis of Cockroach Oothecae and Exuviae by Solid-State ^{13}C NMR
Insect Biochem. 21, 149 (1991).
144. J. R. Garbow and J. Schaefer
 Magic-Angle ^{13}C NMR Study of Wheat Flours and Doughs
J. Ag. Food Chem. 39, 877 (1991).
 145. A. M. Christensen, J. Schaefer, and K. J. Kramer
 Comparison of Rotational-Echo Double-Resonance and
 Double-Cross Polarization NMR for Detection of
 Weak Heteronuclear Dipolar Coupling in Solids
Mag. Reson. Chem. 29, 418 (1991).
 146. A. M. Christensen, J. Schaefer, K. J. Kramer, T. D. Morgan, and T. L. Hopkins
 Detection of Cross-Links in Insect Cuticle by REDOR NMR Spectroscopy
J. Am. Chem. Soc. 113, 6799 (1991).
 147. J. R. Garbow and J. Schaefer
 Magic-Angle ^{13}C NMR Analysis of Hard Wheat Flour and Dough
Water Relationships in Food, H. Levine and L. Slade, eds., Plenum Press, N. Y., 1991, p. 509.
 148. S. H. Holl, J. Schaefer, W. M. Goldberg, K. J. Kramer, T. D. Morgan, and T. L. Hopkins
 Comparison of Black Coral Skeleton and Insect Cuticle by a Combination of ^{13}C NMR and
 Chemical Analyses
Arch. Biochem. and Biophys. 292, 107 (1992).
 149. T. M. Forrest, G. E. Wilson, Y. Pan, and J. Schaefer
 Characterization of Cross-Linking of Cell Walls of *B. subtilis*
J. Biol. Chem. 266, 24485 (1991).
 150. T. Gullion and J. Schaefer
Elimination of Resonance Offset Effects in REDOR NMR
J. Magn. Reson. 92, 439 (1991).
 151. A. W. Hing, S. Vega, and J. Schaefer
 Transferred-Echo Double-Resonance NMR
J. Magn. Reson. 96, 205 (1992).
 152. A. Schmidt, R. A. McKay, and J. Schaefer
 Internuclear Distance Measurements Between Deuterium and a
 Spin-1/2 Nucleus in Rotating Solids
J. Magn. Reson. 96, 644 (1992).
 153. S. M. Holl, J. Schaefer, W. M. Goldberg, K. J. Kramer, T. D. Morgan, and T. L. Hopkins
 Comparison of Black Coral Skeleton and Insect Cuticle by a
 Combination of Carbon-13 NMR and Chemical Analyses
Archives of Biochem. and Biophys. 292, no. 1, 107 (1992).

154. G. R. Marshall, D. D. Beusen, K. Kociolek, A. S. Redlinski, M. T. Leplawy, S. M. Holl, R. A. McKay, and J. Schaefer
Accurate Determination of an 8 Å Interatomic Distance
between ^{19}F and ^{13}C labels by NMR
Peptides - Chemistry and Biology: Proceedings of the Twelfth American Peptide Symposium; J. A. Smith, J. E. Rivier, eds. (1992)
155. S. M. Holl, G. R. Marshall, D. D. Beusen, D. Kociolek, A. S. Redlinski, M. T. Leplawy, R. A. McKay, S. Vega, and J. Schaefer
Determination of an 8-Å Interatomic Distance in a Helical Peptide by Solid-State NMR Spectroscopy
J. Am. Chem. Soc. 114 4830 (1992).
156. M. Afeworki, R. A. McKay, and J. Schaefer
Selective Observation of the Interface of Heterogeneous Polycarbonate/Polystyrene Blends by Dynamic Nuclear Polarization Carbon-13 NMR Spectroscopy
Macromolecules 25 4084 (1992).
157. M. Afeworki, and J. Schaefer
Mechanism of DNP-Enhanced Polarization Transfer across the Interface of Polycarbonate/Polystyrene Heterogeneous Blends
Macromolecules 25 4092 (1992).
158. M. Afeworki, and J. Schaefer
Molecular Dynamics of Polycarbonate Chains at the Interface of Polycarbonate/Polystyrene Heterogeneous Blends
Macromolecules 25 4097 (1992).
159. M. Afeworki, S. Vega, and J. Schaefer
Directing Electron-to-Carbon Polarization Transfer in Homogeneously Doped Polycarbonates
Macromolecules 25 4100 (1992).
160. P. L. Lee, and J. Schaefer
Characterization of Interchain Interactions in Perdeuterated Bisphenol-A Polycarbonate by Residual-Proton Solid-State NMR
Macromolecules 25 5559 (1992).
161. A.M. Christensen and J. Schaefer
Solid-State REDOR NMR Determination of Intra-and Intermolecular ^{31}P - ^{13}C Distances for Shikimate-3-phosphate and $[1\text{-}^{13}\text{C}]\text{Glyphosate}$ Bound to Enolpyruvylshikimate-3-phosphate Synthase
Biochemistry 32, 2868 (1993).
162. Y. Pan, N.S. Shenouda, G.E. Wilson, and J. Schaefer

- Cross-links in Cell Walls of *Bacillus subtilis* by Rotational-echo Double Resonance ^{15}N NMR
J. Biol. Chem. 268, 18692 (1993).
163. A. Schmidt, T. Kowalewski, and J. Schaefer
Local Packing in Glassy Polycarbonate by Carbon-Deuterium REDOR NMR
Macromolecules 26, 1729 (1993).
164. S. M. Holl, D. Hansen, J. H. Waite, and J. Schaefer
Solid-State NMR Analysis of Crosslinking in Mussel Protein Glue
Arch. Biochem. Biophys. 302, 255 (1993).
165. M. Afeworki, R. A. McKay, and J. Schaefer
Dynamic nuclear polarization enhanced NMR of polymer-blend interfaces
Mat. Sci. Eng. A162, 221 (1993).
166. A. W. Hing, S. Vega, and J. Schaefer
Measurement of Heteronuclear Dipolar Coupling by Transferred-Echo Double-Resonance NMR
J. Magn. Reson. 103, 151 (1993).
167. L. M. McDowell, S. M. Holl, S. Qian, E. Li, and J. Schaefer
Inter-Tryptophan Distances in Rat Cellular Retinol Binding Protein II by Solid-State NMR
Biochemistry 32, 4560 (1993).
168. Y. Pan, N. S. Shenouda, G. E. Wilson, and J. Schaefer
Cross-links in Cell Walls of *Bacillus subtilis* by Rotational-echo Double-resonance ^{15}N NMR
J. Biol. Chem. 268, 18692 (1993).
169. L. McDowell, E. R. Cohen, and J. Schaefer
Two-dimensional, Rotational-echo Double-resonance NMR of Cell Culture Metabolism
J. Biol. Chem. 268, 20768 (1993).
170. J. R. Garbow, W. P. Ripley, V. Bork, Y. Pan, and J. Schaefer
Milacemide Metabolism in Rat Liver and Brain Slices by Solids NMR
Drug Metab. Disp. 22, 298 (1994).
171. W. M. Goldberg, T. L. Hopkins, S. M. Holl, J. Schaefer, K. J. Kramer, T. D. Morgan, and K. Kim
Chemical composition of the sclerotized black coral skeleton (Coelenterata: Antipatharia): a
comparison of two species
Comp. Biochem. Physiol. 107B, 633 (1994).
172. W. Zhu, C. A. Klug, and J. Schaefer
Measurement of Dipolar Coupling within Isolated Spin-1/2 Homonuclear Pairs by CEDRA NMR
J. Magn. Reson. 108, 99 (1994).
173. J. Schaefer
Cross-links in Plant and Insect Cell Walls by Solid-State NMR
"The Past Present and Future of Plant Biology," Washington University Press, ISBN: 0-912260-

- 12-2, St. Louis, 1993, p.108.
174. C. A. Klug, W. Zhu, M. E. Merritt, and J. Schaefer
Compensated XY8-DRAMA Pulse Sequence for Homonuclear Dephasing
J. Magn. Reson. 109, 134 (1994).
 175. A. W. Hing, N. Tjandra, P. F. Cottam, J. Schaefer, and C. Ho
An Investigation of the Ligand-Binding Site of the Glutamine-Binding Protein of *Escherichia coli*
Using Rotational-Echo Double-Resonance NMR
Biochemistry 33, 8651 (1994).
 176. G. Tong, Y. Pan, M. Afeworki, M. D. Poliks, and J. Schaefer
REDOR NMR To Observe the Interfaces of Heterogeneous Polymer Blends
Macromolecules 28, 1719 (1995).
 177. P. L. Lee and J. Schaefer
Local Packing in Glassy Polycarbonate by Carbon-Deuterium REDOR NMR. 2
Macromolecules 28, 1921 (1995).
 178. P. L. Lee, T. Kowalewski, M. D. Poliks, and J. Schaefer
Interchain Packing in Bisphenol A Polycarbonate
Macromolecules 28, 2476 (1995).
 179. P. L. Lee and J. Schaefer
Main-Chain Reorientation in Polycarbonate by Carbon-Deuterium NMR
Macromolecules 28, 2577 (1995).
 180. D. D. Mueller, A. Schmidt, K. L. Pappan, R. A. McKay, and J. Schaefer
Activator Carbamino Carbon to Inhibitor Phosphorous Internuclear Distances in Ribulose-1,5-
bisphosphate Carboxylase/Oxygenase
Biochemistry 34, 5597 (1995).
 181. J. Schaefer
REDOR NMR of Stable-Isotope Labeled Protein Binding Sites
U. S. Department of Commerce (National Technical Information Service)
Document LA-12893-C, 1995, p. 197.
 182. P. Wappner, K. J. Kramer, T. L. Hopkins, M. Merritt, J. Schaefer, and L. A. Quesada-Allue
Ceratitis capitata Mutant Lacking Catecholamines for Tanning the Puparium
Insect Biochem. Molec. Biol. 25, 365 (1995).
 183. D. D. Beusen, L. M. McDowell, U. Slomczynska, and J. Schaefer
Solid-State NMR Analysis of the Conformation of an Inhibitor Bound to Thermolysin
J. Med. Chem. 38, 2742 (1995).
 184. P. L. Lee, C. Xiao, J. Wu, A. F. Yee, and J. Schaefer
Characterization of Absorbed Water in Perdeuterated Polycarbonate by Residual-Proton NMR

- Macromolecules 28, 6477 (1995).
185. K. J. Kramer, T. L. Hopkins, and J. Schaefer
Applications of Solids NMR to the Analysis of Insect Sclerotized Structures
Insect Biochem. Molec. Biol. 25, 1067 (1995).
 186. L. M. McDowell, M. Lee, J. Schaefer, and K. S. Anderson
Observation of an Aminoacrylate Enzyme Intermediate in the Tryptophan Synthase Reaction by
Solid-State NMR
J. Am. Chem. Soc. 117, 12352 (1996).
 187. L. M. McDowell, A. Schmidt, E. R. Cohen, D. R. Studelska, and J. Schaefer
**Structural Constraints on the Ternary Complex of 5-Enolpyruvylshikimate-3-phosphate
Synthase from Rotational-echo Double-resonance NMR**
J. Mol. Biol. 256, 160 (1996).
 188. J. Schaefer
REDOR & TEDOR
Encyclopedia of Nuclear Magnetic Resonance (V. III), Wiley, New York, 1996, p. 3977.
 189. C. A. Klug and J. Schaefer
Double TEDOR for the Direct Detection of Stable-Isotope Triads
J. Magn. Reson. B 110, 176 (1996).
 190. L. M. McDowell, M. Lee, R. A. McKay, K. S. Anderson, and J. Schaefer
Intersubunit Communication in Tryptophan Synthase by Carbon-13 and Fluorine-19 REDOR
NMR
Biochemistry 35, 3328 (1996).
 191. S. M. Holl, T. Kowalewski, and J. Schaefer
Characterization of two forms of cadmium phosphide by magic-angle spinning ³¹P NMR
Solid State NMR 6, 39 (1996).
 192. N. S. Shenouda, Y. Pan, J. Schaefer, and G. E. Wilson
A simple solid-state NMR method for determining peptidoglycan crosslinking in *Bacillus subtilis*
Biochem. Biophys. Acta 1289, 217 (1996).
 193. L. M. McDowell, C. A. Klug, D. D. Beusen, and J. Schaefer
Ligand Geometry of the Ternary Complex of 5-Enolpyruvylshikimate-3-phosphate Synthase from
Rotational-Echo Double-Resonance NMR
Biochemistry 35, 5395 (1996).
 194. D. R. Studelska, C. A. Klug, D. D. Beusen, L. M. McDowell, and J. Schaefer
Long-Range Distance Measurements of Protein Binding Sites by Rotational-Echo Double-
Resonance NMR
J. Am. Chem. Soc. 118, 5476 (1996).

195. C. A. Klug, L. A. Burzio, J. H. Waite, and J. Schaefer
In Situ Analysis of Peptidyl DOPA in Mussel Byssus Using Rotational-Echo Double-Resonance NMR
 Arch. Biochem. Biophys. 333, 221 (1996).
196. D. J. Hirsh, J. Hammer, W. L. Maloy, J. Blazyk, and J. Schaefer
 Secondary Structure and Location of a Magainin Analogue in Synthetic Phospholipid Bilayers
 Biochemistry 35, 12733 (1996).
197. C. A. Klug and J. Schaefer
 Extension of CEDRA to Homonuclear Coherence Transfers
 J. Magn. Reson. A 122, 251 (1996).
198. L. M. McDowell and J. Schaefer
 High-resolution NMR of biological solids
 Curr. Op. Struct. Biology 6, 624 (1996).
199. C. A. Klug, D. R. Studelska, G. Chen, S. R. Gilbertson, and J. Schaefer
 Distance between phosphine-sulfide sidechains of a disubstituted peptide by DRAMA ^{31}P NMR
 Solid State NMR 7, 173 (1996).
200. L. M. McDowell, D. Barkan, G. E. Wilson, and J. Schaefer
 Structural constraints on the complex of elongation factor Tu with magnesium guanosine diphosphate from rotational-echo double-resonance NMR
 Solid State NMR 7, 203 (1996).
201. S. R. Gilbertson, X. Wang, G. S. Hoge, C. A. Klug, and J. Schaefer
 Synthesis of Phosphine-Rhodium Complexes Attached to a Standard Peptide Synthesis Resin
 Organomet. 15, 4678 (1996).
202. M. E. Merritt, A. M. Christensen, K. J. Kramer, T. L. Hopkins, and J. Schaefer
 Detection of Intercatechol Cross-Links in Insect Cuticle by Solid-State ^{13}C and ^{15}N NMR
 J. Am. Chem. Soc. 118, 11278 (1996).
203. K. L. Wooley, C. A. Klug, K. Tasaki, and J. Schaefer
Shapes of Dendrimers from Rotational-Echo Double-Resonance NMR
 J. Am. Chem. Soc. 119, 53 (1997).
204. C. A. Klug, W. Zhu, K. Tasaki, and J. Schaefer
"Orientational Order of Locally Parallel Chain Segments in Glassy Polycarbonate from ^{13}C - ^{13}C Dipolar Couplings"
 Macromolecules 30, 1734 (1997).
205. C. A. Klug, K. Tasaki, N. Tjandra, C. Ho, and J. Schaefer
 Closed Form of Liganded Glutamine-Binding Protein by REDOR NMR
 Biochemistry 36, 9405 (1997).

206. G. Tong, Y. Pan, H. Dong, R. Pryor, G. E. Wilson, and J. Schaefer
Structure and Dynamics of Pentaglycyl Bridges in the Cell Walls of *S. aureus* by ^{13}C - ^{15}N REDOR
Biochemistry 36, 9859 (1997).
207. J. M. Goetz and J. Schaefer
REDOR Dephasing by Multiple Spins in the Presence of Molecular Motion
J. Magn. Reson. 127, 147 (1997).
208. C. A. Klug, P. L. Lee, I.-S. H. Lee, M. M. Kreevoy, R. Yaris, and J. Schaefer
Structure of a Dihydrated, Strongly Hydrogen-Bonded Crystal
J. Phys. Chem. B. 101, 8086, (1997).
209. C. A. Klug, J. Wu, C. Xiao, A. F. Yee, and J. Schaefer
Chain Packing and Dynamics in Polycarbonate Block Copolymers
Macromolecules, 30, 6302 (1997).
210. M. P. Espe, B. R. Mattes, and J. Schaefer
Packing in Amorphous Regions of Hydrofluoric-Acid Doped Polyaniline Powder by ^{15}N - ^{19}F
REDOR NMR
Macromolecules, 30, 6307 (1997).
211. M. E. Merritt, L. Heux, J. L. Halary, and J. Schaefer
Determination of the Extent of Reaction of Amine Cross-Linked Epoxy Resins by Solid-State ^{13}C
and ^{15}N NMR
Macromolecules, 30, 6760 (1997).
212. G. Tong and J. Schaefer
Characterization of the Interface of Heterogeneous Blends of Polycarbonate and Polyfluorostyrene
by ^{13}C - ^{19}F REDOR NMR
Macromolecules, 30, 7522 (1997).
213. D. R. Studelska, L. M. McDowell, M. P. Espe, C. A. Klug, and J. Schaefer
Slowed Enzymatic Turnover Allows Characterization of Intermediates by Solid-State NMR
Biochemistry 36, 15555 (1997).
214. A. H. Baugher, M. P. Espe, J. M. Goetz, J. Schaefer, and R. H. Pater
Cross-Linked Structures of Nadic-End-Capped Polyimides
Macromolecules, 30, 6295 (1997).
215. J. M. Goetz and J. Schaefer
Orientational Information in Solids from REDOR Sidebands
J. Magn. Reson., 129, 222 (1997).
216. M. E. Merritt, J. M. Goetz, D. Whitney, C-P P. Chang, L. Heux, J. L. Halary, and Jacob Schaefer
Location of the Antiplasticizer in Cross-Linked Epoxy Resins by ^2H , ^{15}N , and ^{13}C REDOR NMR
Macromolecules, 31, 1214 (1997).

217. J. M. Goetz, J. Wu, A. F. Yee, and J. Schaefer
Bundle Description of Packing and Dynamics in Polycarbonate Homopolymers, Copolymers, and Blends
Macromolecules, 31, 3016 (1998).
218. J. M. Goetz, J. H. Wu, A. F. Yee, and J. Schaefer
Two-dimensional transferred-echo double resonance study of molecular motion in a fluorinated polycarbonate
Solid State NMR, 12, 87 (1998).
219. L. P. Chen, A. F. Yee, J. M. Goetz, and J. Schaefer
Molecular Structure Effects on the Secondary Relaxation and Impact Strength of a Series of Polyester Copolymer Glasses
Macromolecules, 31, 5371 (1998).
220. D. J. Hirsh, N. Lazaro, L. R. Wright, J. M. Boggs, T. J. McIntosh, J. Schaefer, and J. Blazyk
A New Monofluorinated Phosphatidylcholine Forms Interdigitated Bilayers
Biophysical Journal, 75, 1858 (1998).
221. A. H. Baugher, J. M. Goetz, L. M. McDowell, H. Huang, K. L. Wooley, and J. Schaefer
Location of Fluorotyryptophan Sequestered in an Amphiphilic Nanoparticle by REDOR NMR
Biophysical Journal, 75, 2574 (1998).
222. J. Schaefer
REDOR NMR of Biological Solids: From Protein Binding Sites to Bacterial Cell Walls
in *Recent Trends in Molecular Recognition* (F. Diederich and H. Kunzer, Eds), Springer, Berlin, 1998, pp 26-52.
223. K. J. Kramer, T. L. Hopkins, and J. Schaefer
Analysis of Intractable Biological Samples by Solids NMR
in *Nitrogen-Containing Macromolecules in the Bio- and Geosphere* (B. A. Stankiewicz and P. F. van Bergen, Eds), ACS Symposium Series (707), Washington, DC, 1998, pp 14-33.
224. J. Schaefer
REDOR-Determined Distances from Heterospins to Clusters of ^{13}C Labels
J. Magn. Reson., 137, 272 (1999).
225. T. L. Hopkins, S. R. Starkey, R. Xu, M. E. Merritt, J. Schaefer, and K. J. Kramer
Catechols Involved in Sclerotization of Cuticle and Egg Pods of the Grasshopper, *Melanoplus sanguinipes*, and Their Interactions with Cuticular Proteins
Arch. Insect Biochem. and Physiology, 40, 119 (1999).

226. L. M. McDowell, L. A. Burzio, J. H. Waite, and J. Schaefer
Rotational Echo Double Resonance Detection of Cross-links Formed in Mussel Byssus under High-Flow Stress
J. Biol. Chem., 274, 20293 (1999).
227. J. M. Goetz, B. Poliks, D. R. Studelska, M. Fischer, K. Kugelbrey, A. Bacher, M. Cushman, and J. Schaefer
Investigation of the Binding of Fluorolumazines to the 1-MDa Capsid of Lumazine Synthase by $^{15}\text{N}\{^{19}\text{F}\}$ REDOR NMR
J. Am. Chem. Soc., 121, 7500 (1999).
228. L. M. McDowell, M. A. McCarrick, D. R. Studelska, W. J. Guilford, D. Arnaiz, J. L. Dallas, D. R. Light, M. Whitlow, and J. Schaefer
Conformations of Trypsin-Bound Amidine Inhibitors of Blood Coagulant Factor Xa by Double REDOR and MD Simulations
J. Med. Chem., 42, 3910 (1999).
229. Y. Li, B. Poliks, L. Cegelski, M. Poliks, Z. Gryczynski, G. Piszczek, P. G. Jagtap, D. R. Studelska, D. G. I. Kingston, J. Schaefer, and S. Bane
Conformation of Microtubule-Bound Paclitaxel Determined by Fluorescence Spectroscopy and REDOR NMR
Biochemistry, 39, 281 (2000).
230. A. W. Hing, J. Schaefer, and G. S. Kobayashi
Deuterium NMR investigation of an amphotericin B derivative in mechanically aligned lipid bilayers
Biochem Biophys Acta, 1463, 323, (2000).
231. A. K. Mehta, D. J. Hirsh, N. Oyler, G. P. Drobny, and J. Schaefer
Carbon-Proton Dipolar Decoupling in REDOR
J. Magn. Reson., 145, 156 (2000).
232. H-M Kao, A. Stefanescu, K. L. Wooley, and J. Schaefer
Location of Terminal Groups of Dendrimers in the Solid State by REDOR NMR
Macromolecules, 33, 6214 (2000).
233. J. Wu, C. Xiao, A. F. Yee, J. M. Goetz, and J. Schaefer
Local Chain Dynamics in Poly(fluorocarbonate)s
Macromolecules, 33, 6849 (2000).
234. J. Liu, A. F. Yee, J. M. Goetz, and J. Schaefer
Local Chain Dynamics in Poly(ester carbonate)s
Macromolecules, 33, 6853 (2000).
235. H. Huang, K. L. Wooley, and J. Schaefer
REDOR Determination of the Composition of Shell Cross-Linked Amphiphilic Core-Shell Nanoparticles and the Partitioning of Sequestered Fluorinated Guests

- Macromolecules, 34, 547 (2001).
236. H-M Kao, R. D. O'Connor, A. K. Mehta, H. Huang, B. Poliks, K. L. Wooley, and J. Schaefer
Location of Cholic Acid Sequestered by Core-Shell Nanoparticles Using REDOR NMR
Macromolecules, 34, 544 (2001).
237. J. Wu, C. Xiao, A. F. Yee, C. A. Klug, and J. Schaefer
Controlling Molecular Mobility and Ductile-Brittle Transitions of Polycarbonate Copolymers
J. Poly. Sci. B, 39, 1730 (2001).
238. Q. Ma, E. E. Remsen, T. Kowalewski, J. Schaefer, and K. L. Wooley
Environmentally-Responsive, Entirely Hydrophilic, Shell Cross-linked (SCK) Nanoparticles
Nanoletters, 1, 651 (2001).
239. R. D. O'Connor and J. Schaefer
Relative CSA-Dipolar Orientation from REDOR Sidebands
J. Magn. Reson., 154, 46 (2002)
240. R. D. O'Connor, B. Poliks, D. H. Bolton, J. M. Goetz, J. A. Byers, K. L. Wooley, and J. Schaefer
Chain Packing in Linear Phenol-Polycarbonate by $^{13}\text{C}\{^2\text{H}\}$ REDOR
Macromolecules, 35, 2608 (2002)
241. R. D. O'Connor, J. A. Byers, W. D. Arnold, E. Oldfield, K. L. Wooley, and J. Schaefer
Chain Packing in Ethoxyphenyl-Polycarbonate by $^{13}\text{C}\{^2\text{H}\}$ REDOR
Macromolecules, 35, 2618 (2002)
242. A. K. Mehta, D. R. Studelska, M. Fischer, A. Giessauf, K. Kemter, A. Bacher, M. Cushman, and J. Schaefer
Investigation of the Binding of Epimer A of the Covalent Hydrate of 6,7-Bis(trifluoromethyl)-8-D-ribityllumazine to a Recombinant F22W *B. subtilis* Lumazine Synthase Mutant by $^{15}\text{N}\{^{19}\text{F}\}$ REDOR
J. Org. Chem., 67, 2087 (2002)
243. S. J. Kim, L. Cegelski, D. R. Studelska, R. D. O'Connor, A. K. Mehta, and J. Schaefer
Rotational-Echo Double Resonance Characterization of Vancomycin Binding Sites in *Staphylococcus aureus*
Biochemistry, 41, 6967 (2002)
244. L. Cegelski, S. J. Kim, A. W. Hing, D. R. Studelska, R. D. O'Connor, A. K. Mehta, and J. Schaefer
Rotational-Echo Double Resonance Characterization of the Effects of Vancomycin on Cell Wall Synthesis in *Staphylococcus aureus*
Biochemistry, 41, 13053-13058 (2002).
245. R. D. O'Connor, Q. Zhang, K. L. Wooley, and J. Schaefer
Crystallization of Poly(ϵ -caprolactone) under Nanoparticle Confinement
Helv. Chim. Acta, 85, 3219-3224 (2002).

246. D. Seebach, T. Sifferlen, D. J. Bierbaum, M. Rueping, B. Jaun, B. Schweizer, J. Schaefer, A. K. Mehta, R. D. O'Connor, B. H. Meier, M. Ernst, and A. Glattli
Isotopically Labelled and Unlabelled β -Peptides with Geminal Dimethyl Substitution in 2-Position of Each Residue: Synthesis and NMR Investigation in Solution and in the Solid State
Helv. Chim. Acta, 85, 2877-2917 (2002).
247. L. M. McDowell, M. A. McCarrick, D. R. Studelska, R. D. O'Connor, D. R. Light, W. J. Guilford, D. Arnaiz, M. Adler, J. L. Dallas, B. Poliks, and J. Schaefer
Human Factor Xa Bound Amidine Inhibitor Conformation by Double REDOR NMR and Molecular Dynamics Simulations
J. Med. Chem., 46, 359-363 (2003).
248. D. H. Bolton, J. M. Goetz, D. Gan, J. A. Byers, B. Poliks, K. L. Wooley, and J. Schaefer
Chain Dynamics in Linear and Hyperbranched Phenol-Polycarbonates
Macromolecules, 36, 2368-2373 (2003).
249. D. R. Studelska, L. M. McDowell, M. Adler, R. D. O'Connor, A. K. Mehta, W. J. Guilford, J. L. Dallas, D. Arnaiz, D. R. Light, and J. Schaefer
Conformation of a Bound Inhibitor of Blood Coagulant Factor Xa
Biochemistry, 42, 7942-7949 (2003).
250. A. K. Mehta, L. Cegelski, R. D. O'Connor, and J. Schaefer
REDOR with a Relative Full-echo Reference
J. Magn. Reson., 163, 182-187 (2003).
251. A. K. Mehta and J. Schaefer
Rotational-echo Double Resonance of Uniformly Labeled ^{13}C Clusters
J. Magn. Reson., 163, 188-191 (2003).
252. T. K. Weldeghiorghis and J. Schaefer
Compensating for Pulse Imperfections in REDOR
J. Magn. Reson., 165, 230-236 (2003).
253. L. M. McDowell, B. Poliks, D. R. Studelska, R. D. O'Connor, D. D. Beusen, and J. Schaefer
Rotational-echo Double-Resonance NMR-restrained Model of the Ternary Complex of 5-Enolpyruvylshikimate-3-phosphate Synthase
J. Biomol. NMR, 28, 11-29 (2004).
254. L. M. McDowell, D. R. Studelska, B. Poliks, R. D. O'Connor, and J. Schaefer
Characterization of the Complex of a Trifluoromethyl-Substituted Shikimate-Based Bisubstrate Inhibitor and 5-Enolpyruvylshikimate-3-phosphate Synthase
Biochemistry, 43, 6606-6611 (2004).
255. O. Toke, W. L. Malloy, S. J. Kim, J. Blazyk, and J. Schaefer
Secondary Structure and Lipid Contact of a Peptide Antibiotic in Phospholipid Bilayers by REDOR
Biophys. J., 87, 662-674 (2004).

256. O. Toke, R. D. O'Connor, T. K. Weldeghiorghis, W. L. Malloy, R. W. Glaser, A. S. Ulrich, and J. Schaefer
Structure of (KIAGKIA)₃ Aggregates in Phospholipid Bilayers by Solid-State NMR
 Biophys. J., 87, 675-687 (2004).
257. A. H. Mehta, Y. Shayo, H. Vankayalapati, L. H. Hurley, and J. Schaefer
 Structure of a Quinobenzoxazine-G-Quadruplex Complex by REDOR NMR
 Biochemistry, 43, 11953-11958 (2004).
258. Y. L. Jiang, L. M. McDowell, B. Poliks, D. R. Studelska, C. Cao, G. S. Potter, J. Schaefer, F. Song, and J. T. Stivers
 Recognition of an Unnatural Difluorophenyl Nucleotide by Uracil DNA Glycosylase
 Biochemistry, 43, 15429-15438.
259. L. Cegelski and J. Schaefer
Glycine Metabolism in Intact Leaves by *in vivo* ¹³C and ¹⁵N Labeling
 J. Biol. Chem. 280, 39238-39245 (2005).
260. L. Cegelski and J. Schaefer
 NMR Determination of Photorespiration in Intact Leaves using *in vivo* ¹³CO₂ Labeling
 J. Magn. Reson., 178, 1-10 (2006)
261. L. Cegelski, C. V. Rice, R. D. O'Connor, A. L. Caruano, G. P. Tochtrop, Z. Y. Cai, D. F. Covey, and J. Schaefer
 Mapping the Locations of Estradiol and Potent Neuroprotective Analogues in Phospholipid Bilayers by REDOR
 Drug Devel. Res., 66, 93-102 (2006).
262. L. Cegelski, D. Stueber, A. K. Mehta, D. W. Kulp, P. H. Axelsen, and J. Schaefer
Conformational and Quantitative Characterization of Oritavancin-Petidoglycan Complexes in Whole Cells of *Staphylococcus aureus* by *in vivo* ¹³C and ¹⁵N Labeling.
 J. Mol. Biol., 357, 1253-1262 (2006).
263. S. J. Kim, L. Cegelski, M. Preobrazhenskaya, and J. Schaefer
 Structures of *Staphylococcus aureus* Cell-Wall Complexes with Vancomycin, Eremomycin, and Chloroeremomycin Derivatives by ¹³C{¹⁹F} and ¹⁵N{¹⁹F} Rotational-Echo Double Resonance
 Biochemistry, 45, 5235-5250 (2006).
264. D. Stueber, A. K. Mehta, Z. Chen, K. L. Wooley, and J. Schaefer
Local Order in Polycarbonate Glasses by ¹³C{¹⁹F} Rotational-Echo Double Resonance NMR
 J. Polym. Sci. B, 44, 2760-2775 (2006).
265. O. Toke, L. Cegelski, and J. Schaefer
 Peptide Antibiotics in Action: Investigation of Polypeptide Chains in Insoluble Environments by REDOR
 Biochim. Biophys. Acta, 1758, 1314-1329 (2006).

266. S. Matsuoka and J. Schaefer
Double-quantum Filtered Rotational-Echo Double Resonance
J. Magn. Reson. 183, 252-258 (2006).
267. Y. Paik, C. Yang, B. Metaferia, S. Tang, S. Bane, R. Ravindra, N. Shanker, A. A. Alcaraz, S. A. Johnson, J. Schaefer, R. D. O'Connor, L. Cegelski, J. P. Synder, and D. G. I. Kingston
REDOR NMR Distance Measurements for the Tubulin-Bound Paclitaxel Conformation
J. Am. Chem. Soc. 129, 361-370 (2007).
268. Y. Paik, B. Poliks, C. C. Rusa, A. E. Tonelli, and J. Schaefer
Molecular Motion of Polycarbonate Included in γ -Cyclodextrin
J. Polym. Sci. B, 45, 1271-1282 (2007)
269. J. Schaefer, H. Jiang, A. E. Ransome, and T. J. Kappock
Multiple Active Site Histidine Protonation States in *Acetobacter acetii* N⁵-Carboxyaminoimidazole Ribonucleotide Mutase Detected by REDOR NMR
Biochemistry, 46, 9507-9512 (2007)
270. S. Matsuoka and J. Schaefer
Dipolar double-quantum filtered rotational-echo double resonance
Magn. Res. Chem., 45, 561-564 (2007)
271. S. J. Kim, L. Cegelski, D. Stueber, M. Singh, E. Dietrich, K. S. E. Tanaka, T. R. Parr, Jr., A. R. Far, and J. Schaefer
Oritavancin exhibits dual mode of action to inhibit cell-wall biosynthesis in *Staphylococcus aureus*
J. Mol. Biol., 377, 281-293 (2008).
272. S. J. Kim, S. Matsuoka, G. J. Patti, and J. Schaefer
Vancomycin derivative with damaged D-Ala-D-Ala binding cleft binds to cross-linked peptidoglycan in the cell wall of *Staphylococcus aureus*
Biochemistry, 47, 3822-3831 (2008)
273. T. K. Weldeghiorghis, D. Stueber, and J. Schaefer
Slow motion in [*ring*-fluoro]polycarbonate by CODEX
J. Polym. Sci. B, 46, 1062-1066 (2008)
274. Tsyr-Yan Yu and J. Schaefer
REDOR NMR Characterization of DNA Packaging in Bacteriophage T4
J. Mol. Biol., 382, 1031-1042 (2008).
275. G. J. Patti, J. Chen, J. Schaefer, and M. L. Gross
Characterization of Structural Variations in the Peptidoglycan of Vancomycin-Susceptible *Enterococcus faecium*: Understanding Glycopeptide-Antibiotic Binding Sites Using Mass Spectrometry
J. Am. Soc. Mass. Spectrom., 19, 1467-1475 (2008).

276. G. J. Patti, S. J. Kim, and J. Schaefer
Characterization of the Peptidoglycan of Vancomycin-Susceptible *Enterococcus faecium*
Biochemistry, 47, 8378-8375 (2008).
277. Tsyr-Yan Yu, R. D. O'Connor, A. C. Sivertsen, C. Chiauuzi, B. Poliks, M. Fischer, A. Bacher, M. Cushman, and J. Schaefer
 $^{15}\text{N}\{^{31}\text{P}\}$ REDOR NMR Studies of the Binding of Phosphonate Reaction Intermediate Analogues to *Saccharomyces cerevisiae* Lumazine Synthase
Biochemistry, 47, 13942-13951 (2008).
278. S. J. Kim and J. Schaefer
Hydrophobic Side-Chain Length Determines Activity and Conformational Heterogeneity of a Vancomycin Derivative Bound to the Cell Wall of *Staphylococcus aureus*
Biochemistry, 47, 10155-10161 (2008).
279. S. Sharif, S. J. Kim, H. Labischinski, and J. Schaefer
Characterization of Peptidoglycan in *Fem*-Deletion Mutants of Methicillin-Resistant *Staphylococcus aureus* by Solid-State NMR
Biochemistry, 48, 3100-3108 (2009).
280. S. J. Kim, M. Singh, and J. Schaefer
Oritavancin binds to isolated protoplast membranes but not intact protoplasts of *Staphylococcus aureus*
J. Mol. Biol., 391, 414-425 (2009).
281. G. J. Patti, S. J. Kim, T-Y. Yu, E. Dietrich, K. S. E. Tanaka, T. R. Parr, Jr., A. R. Far, and J. Schaefer
Vancomycin and Oritavancin have different modes of action in *Enterococcus faecium*
J. Mol. Biol., 392, 1178-1191 (2009).
282. S. Sharif, M. Singh, S. J. Kim, and J. Schaefer
Staphylococcus aureus peptidoglycan tertiary structure from Carbon-13 spin diffusion
J. Am. Chem. Soc., 131, 7023-7030 (2009).
283. R. Ohashi, J. W. Bartels, J. Xu, K. L. Wooley, and J. Schaefer
Solid-state NMR investigations of the unusual effects resulting from the nanoconfinement of water within amphiphilic crosslinked polymer networks
Adv. Funct. Mater., 19, 3404-3410 (2009).
284. D. Stueber, T-Y Yu, B. Hess, K. Kremer, R. D. O'Connor, and J. Schaefer
Chain packing in polycarbonate glasses
J. Chem. Phys., 132, 104901-1-104901-9 (2010).
285. T-Y Yu, M. Singh, S. Matsuoka, G. J. Patti, G. S. Potter, and J. Schaefer
Variability in C₃-plant cell-wall biosynthesis in a high-CO₂ atmosphere by solid-state NMR spectroscopy.

- J. Am. Chem. Soc., 132, 6335-6341 (2010).
286. T. Gullion, T-Y Yu, M. Singh, G. J. Patti, G. S. Potter, and J. Schaefer
Oxygen-17 appears only in protein in water-stressed soybean leaves labeled by 17O2.
J. Am. Chem. Soc., 132, 10802-10807 (2010).
287. L. Cegelski, R. D. O'Connor, D. Stueber, M. Singh, B. Poliks, and J. Schaefer
Plant Cell-Wall Cross-Links by REDOR NMR Spectroscopy
J. Am. Chem. Soc., 132, 16052-16057 (2010).
288. M. Singh and J. Schaefer
Chain Packing in Glassy Polymers by Natural-Abundance ¹³C-¹³C Spin Diffusion using 2D
Centerband-Only Detection of Exchange
J. Am. Chem. Soc., 133, 2626-2631 (2011).
289. R. C. Dirks, M. Singh, G. S. Potter, L. G. Sobotka, and J. Schaefer
Carbon partitioning in soybean (*Glycine max*) leaves by combined ¹¹C and ¹³C labeling
New Phytologist, 196, 1109-1121 (2012).
290. R. C. Dirks, M. Singh, G. S. Potter, L. G. Sobotka, and J. Schaefer
Glycine metabolism in leaves of *Glycine max* in 200- and 600-ppm CO₂ environments
New Phytologist, 198, 339-342 (2013).
291. S. J. Kim, M. Singh, A. Wohlrab, T-Y Yu, G. J. Patti, R. D. O'Connor, M. VanNieuwenhze, and J. Schaefer
The Isotridecanyl side chain of plusbacin-A₃ is essential for the transglycosylase in inhibition of
peptidoglycan biosynthesis
Biochemistry, 52, 1973-1979 (2013).
292. S. J. Kim, K. S. E. Tanaka, E. Dietrich, A. R. Far, and J. Schaefer
Locations of the hydrophobic side chains of lipoglycopeptides bound to the peptidoglycan of
Staphylococcus aureus
Biochemistry, 52, 3405-3414 (2013).
293. S. J. Kim, M. Singh, M. Preobrazhenskaya, and J. Schaefer
Staphylococcus aureus peptidoglycan stem packing by rotational-echo double resonance NMR
Spectroscopy
Biochemistry, 52, 3651-3659 (2013).
294. S. Sharif, S. J. Kim, H. Labischinski, J. Chen, and J. Schaefer
Uniformity of glycyI bridge lengths in mature cell walls of Fem mutants of methicillin-resistant
Staphylococcus aureus
J. Bacteriology, 195, 1421-1427 (2013).
295. S. J. Kim, M. Singh, S. Sharif, and J. Schaefer
**Cross-Link Formation and Peptidoglycan Lattice Assembly in the FemA Mutant of
*Staphylococcus aureus***

- Biochemistry, 53, 4755-4757 (2014).
296. M. Singh, S. J. Kim, S. Sharif, M. Preobrazhenskaya, and J. Schaefer
REDOR constraints on the peptidoglycan lattice architecture of *Staphylococcus aureus* and its FemA mutant
Biochem. Biophys. Acta, 1848, 363-368 (2015).
297. Y-Jr Chen, X. Huang, N. G. Mahieu, K. Cho, J. Schaefer, and G. J. Patti
Differential incorporation of glucose into biomass during Warburg metabolism
Biochemistry, 53, 4755-4757 (2015).
298. C-H Yao, R. Fowle-Grider, N. G. Mahieu, G-Y Liu, Y-J Chen, R. Wang, M. Singh, G. S. Potter, R. W. Gross, J. Schaefer, S. L. Johnson, and G. J. Patti
Exogenous Fatty Acids Are the Preferred Source of Membrane Lipids in Proliferating Fibroblasts
Cell Chem. Biology, 23, 483-493 (2016).
299. Y-Jr Chen, N. G. Mahieu, X. Huang, M. Singh, P. A. Crawford, S. L. Johnson, R. W. Gross, J. Schaefer, and G. J. Patti
Lactate Metabolism Is Associated with Mammalian Mitochondria
Nature Chem Biol, 23, 937-943 (2016).
300. R. D. O'Connor, M. Singh, J. Chang, S. J. Kim, M. VanNieuwenhze, and J. Schaefer
Dual Mode of Action for Plusbacin A₃ in *Staphylococcus aureus*
J. Phys. Chem. B, 121, 1499-1505 (2017).
301. S. J. Kim, M. Singh, S. Sharif, and J. Schaefer
Desleucyl-Oritavancin with a Damaged D-Ala-D-Ala Binding Site Inhibits the Transpeptidation Step of Cell-Wall Biosynthesis in Whole Cells of *Staphylococcus aureus*.
Biochemistry, 56, 1529-1535 (2017).