

Scientific Publications –Papers and Book Chapters †—Michael F. Brown

†Selected from a total of >170 papers (10,283 total citations; h-index = 56 in Google Scholar), 4 book reviews in *J. Am. Chem. Soc.*; and >352 published abstracts. Most of these articles have been entirely written by myself and my students and together with our coworkers.

For a complete list of our published work in Google Scholar please see:

http://scholar.google.com/citations?hl=en&user=cLFebLkAAAAJ&view_op=list_works

Chemical Education:

133. Kinnun, J. J.; Leftin, A.; **Brown, M. F.** Solid-State NMR Spectroscopy for the Undergraduate Physical Chemistry Laboratory, *J. Chem. Ed.* **2013**, *90*, 123–128.
<https://doi.org/10.1021/ed2004774> 25 citations.
 23. Trindle, C.; **Brown, M.**; Newton, M. G.; Use of Algebraic Symbol-Manipulation Programs in Chemical Research and Education, **1984** in *Computer Education of Chemists* (P. Lykos, Ed.), Wiley, New York, pp. 93-107.
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Biomolecular Solid-State NMR Spectroscopy:

173. Molugu, T. R.; Thurmond, R. L.; Alam, T. M.; Trouard, T. P.; **Brown, M. F.** Phospholipid Headgroups Govern Emergent Properties of Bilayers as Seen by Solid-State ²H NMR Spectroscopy, *Biophys. J.*, **2020**, submitted.
162. Mallikarjunaiah, K. J.; Kinnun, J. J.; Petrache, H. I.; **Brown, M. F.** Flexible Lipid Nanomaterials Studied by NMR Spectroscopy, *Phys. Chem. Chem. Phys.* **2019**, *21*, 18422–18457.
<https://doi.org/10.1039/C8CP06179C> 4 citations.
161. Molugu, T. R.; **Brown, M. F.**, Cholesterol Effects on the Physical Properties of Lipid Membranes Viewed by Solid-State NMR spectroscopy, in: *Cholesterol Modulation of Protein Function*, Rosenhouse-Dantsker, A.; Bukiya, A. (Eds.), *Advances in Experimental Medicine and Biology*, Vol. 115, Springer Nature, Cham, **2019**, pp. 99-133. *Invited book chapter.* https://doi.org/10.1007/978-3-030-04278-3_5 4 citations.
160. Molugu, T. R.; Xu, X.; Leftin, A.; Lee, S. K.; Mallikarjunaiah, K. J. **Brown, M. F.**, Solid-State ²H NMR Studies of Water-Mediated Lipid Membrane Deformation, in: *Modern Magnetic Resonance*, Webb, G. A. (Ed.), Springer, Heidelberg, **2018**. *Invited review.*
https://doi.org/10.1007/978-3-319-28275-6_143-1
156. Perera, S. M. D. C.; Xu, X.; Molugu, T. R.; Mallikarjunaiah, K. J.; Struts, A. V.; **Brown, M. F.**, Solid-State Deuterium NMR Spectroscopy of Rhodopsin, in: *Modern Magnetic Resonance*, Webb, G. A. (Ed.), Springer, Heidelberg, **2017**. *Invited review.*
https://doi.org/10.1007/978-3-319-28275-6_144-1
154. Molugu, T. R.; Xu, X.; Leftin, A.; Lope-Piedrafita, S.; Martinez, G. V.; Petrache, H. I.; **Brown, M. F.**, Solid-State Deuterium NMR Spectroscopy of Membranes, in: *Modern Magnetic Resonance*, Webb, G. A. (Ed.), Springer, Heidelberg, **2017**. *Invited review.*
https://doi.org/10.1007/978-3-319-28275-6_89-1

153. Molugu, T. R.; Lee, S.; **Brown, M. F.** Concepts and Methods of Deuterium NMR Spectroscopy Applied to Biomembranes, *Chem. Rev.* **2017**, *117*, 12087–12132. *Invited review.* <https://doi.org/10.1021/acs.chemrev.6b00619> 43 citations.
148. Struts, A. V.; Barmasov, A. V.; **Brown, M. F.** Spectral Methods for Study of the G-Protein-Coupled Receptor Rhodopsin. II. Magnetic Resonance Spectroscopy, *Opt. Spectrosc.* **2016**, *120*, 286-293. <https://doi.org/10.1134/S0030400X16010197> 8 citations.
143. Kinnun, J. J.; Mallikarjunaiah, K. J.; Petrache, H. I.; **Brown, M. F.** Elastic Deformation and Area Per Lipid of Membranes: Atomistic View From Solid-State Deuterium NMR Spectroscopy, *Biochim. Biophys. Acta* **2015**, *1848*, 246–259. <https://doi.org/10.1016/j.bbamem.2014.06.004> 34 citations.
142. Leftin, A.; Molugu, T. R.; Job, C.; Beyer, K.; **Brown, M. F.**, Area per lipid and cholesterol interactions in membranes from separated local-field ¹³C NMR spectroscopy, *Biophys. J.* **2014**) *107*, 2274–2286. <https://doi.org/10.1016/j.bpj.2014.07.044> 57 citations.
138. **Brown, M. F.**; Struts, A. V. Structural Dynamics of Retinal in Rhodopsin Activation Viewed by Solid-State ²H NMR Spectroscopy, in: *Advances in Biological Solid-State NMR: Proteins and Membrane-Active Peptides*, Separovic, F., and Naito, A. (Eds.), The Royal Society of Chemistry, Cambridge, **2014**, pp. 320–352 *Invited book chapter. Cover article.* <https://doi.org/10.1039/9781782627449-00320>
135. Leftin, A.; Job, C.; Beyer, K.; **Brown, M. F.**, Solid-state ¹³C NMR Reveals Annealing of Raft-Like Membranes Containing Cholesterol by the Intrinsically Disordered Protein α -Synuclein, *J. Mol. Biol.* **2013** *425*, 2973–2987. <https://doi.org/10.1016/j.jmb.2013.04.002> 54 citations.
134. Struts, A. V.; **Brown, M. F.** Activation of Rhodopsin Based on Solid-State NMR Spectroscopy, in *Encyclopedia of Biophysics*, Roberts, G. C. K. (Ed.), Springer-Verlag, Heidelberg, **2013**, pp. 2231–2243. *Invited book chapter.*
125. Leftin, A.; **Brown, M. F.** An NMR Data Base for Simulations of Membrane Dynamics, *Biochim. Biophys. Acta* **2011**, *1808*, 818-839. *Invited review.* <https://doi.org/10.1016/j.bbamem.2010.11.027> 83 citations.
124. Mallikarjunaiah, K. J.; Leftin, A.; Kinnun, J. J.; Justice, M. J.; Rogozea, A. L.; Petrache, H. I.; **Brown, M. F.** Solid-State ²H NMR Demonstrates Correspondence of Hydrostatic and Osmotic Pressures in Lipid Membrane Deformation, *Biophys. J.* **2011**, *100*, 98-107. 35 citations.
119. Brownholland, D.; Longo, G. S.; Struts, A. V.; Justice, M. J.; Szleifer, I.; Petrache, H. I.; **Brown, M. F.**; Thompson, D. H. Phase Separation in Binary Mixtures of Bipolar and Monopolar Lipid Dispersions Revealed by ²H NMR Spectroscopy, Small Angle X-Ray Scattering, and Molecular Theory, *Biophys. J.* **2009**, *97*, 2700-2709. 25 citations.
118. **Brown, M. F.**; Martínez-Mayorga, K.; Nakanishi, K.; Salgado, G. F. J.; Struts, A. V., Retinal Conformation and Dynamics in Activation of Rhodopsin Illuminated by Solid-State ²H NMR Spectroscopy, *Photochem. Photobiol.* **2009**, *85*, 442-453. *Invited review.* 20 citations.
115. Bartels, T.; Bittman, R.; Beyer, K.; **Brown, M. F.** Raft-like Mixtures of Sphingomyelin and Cholesterol Investigated by Solid-State ²H NMR Spectroscopy, *J. Am. Chem. Soc* **2008**, *44*, 14521-14532. <https://doi.org/10.1021/ja801789t> 101 citations

113. Kobayashi, M.; Struts, A. V.; Fujiwara, T.; **Brown, M. F.**; Akutsu, H. Fluid Mechanical Matching of H⁺-ATP Synthase Subunit *c* Ring with Lipids in Membranes Revealed by ²H Solid-State NMR, *Biophys. J.* **2008**, *94*, 4339–4347. 18 citations.
112. Holland, D. P.; Struts, A. V.; **Brown, M. F.**; Thompson, D. H. Bolalipid Membrane Structure Revealed by Solid-State ²H NMR Spectroscopy, *J. Am. Chem. Soc.* **2008**, *130*, 4584–4585. 25 citations.
109. **Brown, M. F.**; Heyn, M. P.; Job, C.; Kim, S.; Moltke, S.; Nakanishi, K.; Nevzorov, A. A.; Struts, A. V.; Salgado, G. F. J.; Wallat, I. Solid-State ²H NMR Spectroscopy of Retinal Proteins in Aligned Membranes, *Biochim. Biophys. Acta* **2007**, *1768*, 2979–3000. 43 citations.
108. Tanaka, K.; Struts, A. V.; Krane, S.; Fujioka, N.; Salgado, G. F. J.; Karina Martínez-Mayorga, K.; **Brown, M. F.**; Koji Nakanishi, K. Synthesis of CD₃-labeled 11-*cis*-Retinals and Applications to Solid-State Deuterium NMR Spectroscopy of Rhodopsin, *Bull. Chem. Soc. Japan* **2007**, *80*, 2177–2184. 14 citations.
105. Petrache, H. I.; **Brown, M. F.** X-ray Scattering and Solid-State ²H NMR Probes of Structural Fluctuations in Lipid Membranes, in: *Methods in Membrane Lipids*, Dopico, A. (Ed.), *Methods in Molecular Biology*, Vol. 400, Humana Press, Totowa, **2007**, pp. 339–351. *Invited review*. 14 citations.
104. Struts, A. V.; Salgado, G. F. J.; Fujioka, N.; Nakanishi, K.; **Brown, M. F.** Structural Analysis and Dynamics of Retinal Chromophore in Dark and Meta I States of Rhodopsin from ²H NMR of Aligned Membranes, *J. Mol. Biol.* **2007**, *372*, 50–66. *Cover article*. 62 citations.
101. **Brown, M. F.**; Lope-Piedrafita, S.; Martinez, G. V.; Petrache, H. I. Solid-State Deuterium NMR Spectroscopy of Membranes, in: *Modern Magnetic Resonance*, Webb, G. A. (Ed., Springer, Heidelberg, **2006**), pp. 245–256. *Invited review*. 25 citations.
100. Salgado, G. F. J.; Struts, A. V.; Tanaka, T.; Krane, S.; Nakanishi, K.; **Brown, M. F.** Solid-State ²H NMR Structure of Retinal in Metarhodopsin I, *J. Am. Chem. Soc.* **2006**, *128*, 11067–11071. 44 citations.
97. Vogel, A.; Katzka, C. P.; Waldmann, H.; Arnold, K.; **Brown, M. F.**; Huster, D. Lipid Modifications of a Ras Peptide Exhibit Altered Packing and Mobility Versus Host Membrane as Detected by ²H Solid-State NMR, *J. Am. Chem. Soc.* **2005**, *127*, 12263–122. 86 citations.
96. Rajamoorthi, K.; Petrache, H. I.; McIntosh, T. J.; **Brown, M. F.** Packing and Viscoelasticity of Polyunsaturated ω-3 and ω-6 Phospholipids as Seen by ²H NMR Spectroscopy and X-Ray Diffraction, *J. Am. Chem. Soc.* **2005**, *127*, 1576–1588. <https://doi.org/10.1021/ja046453b> 130 citations
95. Salgado, G. F. J.; Struts, A. V.; Tanaka, K.; Fujioka, N.; Nakanishi, K.; **Brown, M. F.** Deuterium NMR Structure of Retinal in the Ground State of Rhodopsin, *Biochemistry* **2004**, *43*, 12819–12828. 71 citations.
94. Henzler-Wildman, K. A.; Martinez, G. V.; **Brown, M. F.**; Ramamoorthy, A. Perturbation of the Hydrophobic Core of Lipid Bilayers by the Human Antimicrobial Peptide LL-37, *Biochemistry* **2004**, *43*, 8459–8469. 266 citations.
85. Huber, T.; Rajamoorthi, K.; Kurze, V.; Beyer, K.; **Brown, M. F.** Structure of Docosahexaenoic Acid-Containing Bilayers as Studied by ²H NMR and Molecular Dynamics Simulations, *J. Am. Chem. Soc.* **2002**, *124*, 298–309. <https://doi.org/10.1021/ja011383j> 146 citations.

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82. Petrache, H. I.; Dodd, S. W.; **Brown, M. F.** Area per Lipid and Acyl Length Distributions in Fluid Phosphatidylcholines Determined by ^2H NMR Spectroscopy, *Biophys. J.* **2000**, *79*, 3172-3192. [https://doi.org/10.1016/S0006-3495\(0076551-9](https://doi.org/10.1016/S0006-3495(0076551-9) 624 citations.
80. Nevzorov, A. A.; Moltke, S.; Heyn, M. P.; **Brown, M. F.** Solid-State NMR Lineshapes of Uniaxially Oriented Immobile Systems, *J. Am. Chem. Soc.* **1999**, *121*, 7636-7643. <https://doi.org/10.1021/ja9821910> 53 citations
78. Moltke, S.; Wallat, I.; Sakai, N.; Nakanishi, K.; **Brown, M. F.**; Heyn, M. P. The Angles Between the C_1 -, C_5 -, and C_9 -Methyl Bonds of the Retinylidene Chromophore and the Membrane Normal Increase in the M Intermediate of Bacteriorhodopsin: Direct Determination with Solid-State ^2H -NMR, *Biochemistry* **1999**, *38*, 11762-11772. 28 citations.
77. **Brown, M. F.**; Nevzorov, A. A. ^2H -NMR in Liquid Crystals and Membranes, *Colloids and Surfaces* **1999**, *158*, 281-298. *Invited review.* 25 citations.
75. Hetzer, M.; Gutberlet, T.; **Brown, M. F.**; Camps, X.; Vostrovsky, O.; Schönberger, H.; Hirsch, A.; Bayerl, T. M. Thermotropic Behavior of Lipophilic Derivatized [60]fullerenes Studied by Deuterium NMR, X-ray diffraction, and Microcalorimetry, *J. Phys. Chem. A* **1999**, *103*, 637-642. 38 citations.
73. Moltke, S.; Nevzorov, A. A.; Sakai, N.; Wallat, I.; Job, C.; Nakanishi, K.; Heyn, M. P.; **Brown, M. F.** Chromophore Orientation in Bacteriorhodopsin Determined from the Angular Dependence of Deuterium Nuclear Magnetic Resonance Spectra of Oriented Purple Membranes, *Biochemistry* **1998**, *37*, 11821-11835. 43 citations.
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66. Job, C.; Zajicek, J.; **Brown, M. F.**, Fast Field Cycling Nuclear Magnetic Resonance Spectrometer, *Rev. Sci. Instr.* **1996** *67*, 2113-2122. <https://doi.org/10.1063/1.1147024> 54 citations
64. **Brown, M. F.** Membrane Structure and Dynamics Investigated with NMR Spectroscopy, in *Biological Membranes: A Molecular Perspective from Computation and Experiment* Merz, K. M., and Roux, B., Eds.), Birkhäuser, Basel, **1996**, pp. 175-252. *Invited book chapter.* 55 citations.
58. Job, C.; Pearson, R.; **Brown, M. F.** A Personal Computer-Based NMR Spectrometer, *Rev. Sci. Instr.* **1994**, *65*, 3354-3362. 28 citations.
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55. Thurmond, R. L.; Lindblom, G.; **Brown, M. F.** Curvature, Order, and Dynamics of Lipid Hexagonal Phases Studied by Deuterium NMR Spectroscopy, *Biochemistry* **1993**, *32*, 5394-5410. 90 citations.

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50. Barry, J. A.; Lamparski, H.; Shyamsunder, E.; Osterberg, F.; Cerne, J.; **Brown, M. F.**; O'Brien, D. F. ³¹P NMR and X-Ray Diffraction Study of the Effect of Photopolymerization on Lipid Polymorphism, *Biochemistry* **1992**, *31*, 10114-10120. 19 citations.
43. Rajamoorthi, K.; **Brown, M. F.** Bilayers of Arachidonic Acid Containing Phospholipids Studied By ²H and ³¹P NMR Spectroscopy, *Biochemistry* **1991**, *30*, 4204-4212. 33 citations.
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13. Deese, A. J.; Dratz, E. .; **Brown, M. F.** Retinal Rod Outer Segment Lipids Form Bilayers in the Presence and Absence of Rhodopsin: A ³¹P NMR Study, *FEBS Lett.* **1981**, *124*, 93-99. 59 citations.
8. **Brown, M. F.**; Seelig, J. Influence of Cholesterol on the Polar Region of Phosphatidylcholine and Phosphatidylethanolamine Bilayers, *Biochemistry* **1978**, *17*, 381-384. 236 citations.
7. **Brown, M. F.**; Seelig, J. Ion-Induced Changes in Head Group Conformation of Lecithin Bilayers, *Nature* **1977**, *269*, 721-723. <https://doi.org/10.1038/269721a0> 161 citations.

Nuclear Spin Relaxation and Molecular Dynamics:

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167. **Brown, M. F.** Collective Lipid Dynamics in Biomembranes, *Biochim. Biophys. Acta*, **2020**, submitted.
164. Ryazantsev, M. N.; Nikolaev, D. M.; Struts, A. V.; **Brown, M. F.** Quantum Mechanical and Molecular Mechanics Modeling of Membrane-Embedded Rhodopsin, *J. Membr. Biol.* **2019**, *252*, 425–449. <https://doi.org/10.1007/s00232-019-00095-0>
163. **Brown, M. F.** Collective Dynamics in Lipid Membranes, in: *Characterization of Biological Membranes. Structure and Dynamics*, Nieh, M.-P., Heberle, F. A., Katsaras, J. (Eds.) De Gruyter, Berlin, (2019), pp. 231-267. *Invited review.* <https://doi.org/10.1515/9783110544657-007>
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