**Eric Jon Munson**

Dept. Industrial and Physical Pharmacy

Purdue University

575 Stadium Mall Drive

West Lafayette, IN 47907

Date of Birth: October 28, 1964

Office: (765) 494-1450

Fax: (765) 494-6545

munsone@purdue.edu

### EDUCATION

1988-93 Ph.D. Chemistry

Dissertation Title - “In Situ Solid-State Nuclear Magnetic Resonance Studies of Reactions in Zeolite Catalysts”

Doctoral Advisor - Professor James F. Haw

Texas A&M University, College Station, Texas

1987-88 Fulbright Fellow

Technical University of Munich, Munich, West Germany

1983-87 B.A., *Summa Cum Laude*

Augustana College, Sioux Falls, South Dakota

Major: Chemistry, Physics / Minor: Mathematics

#### PROFESSIONAL EXPERIENCE

2018- Professor and Head – Dept. of Industrial and Phys. Pharmacy, Purdue University 2012 Interim Chair – Dept. of Pharmaceutical Sciences, University of Kentucky

2010-18 Professor – Dept. of Pharmaceutical Sciences, University of Kentucky

2006-10 Professor – Dept. of Pharmaceutical Chemistry, University of Kansas

2002-10 Courtesy Professor – Dept. of Chemistry, University of Kansas

2001-06 Associate Professor – Dept. of Pharmaceutical Chemistry, University of Kansas

2000-01 Associate Professor – University of Minnesota, Minneapolis, Minnesota

1998-00 McKnight Land-Grant Assistant Professor, University of Minnesota

1996 Associate Member of the Graduate Faculty – Department of Pharmaceutics

1994-00 Assistant Professor – University of Minnesota, Minneapolis, Minnesota

1993-94Postdoctoral Associate – Professor Alex Pines, University of California, Berkeley

#### HONORS AND AWARDS

2020 IPEC Foundation Ralph Shangraw Award

2018 Dane O. Kildsig Chair in Industrial and Physical Pharmacy

2017 Chair, Gordon Research Conference on Preclinical Form and Formulation

for Drug Discovery

2016-17 Chair, NIPTE Faculty Committee

2015-20 Chair, Excipients 1 Committee, United States Pharmacopeia

2014-17 Physical Pharmacy and Biopharmaceutics Section, AAPS, Secretary/Treasurer,

(2014), Vice-Chair (2015), Chair-Elect (2016), Chair (2017)

2014 Research Achievement Award - Analysis and Pharmaceutical Quality Section –

American Association of Pharmaceutical Scientists

2012-15 Associate Editor – *Molecular Pharmaceutics*

2010-11 Chair, NIPTE Faculty Committee

2010- Patrick DeLuca Endowed Professor in Pharmaceutical Technology

2009 Fellow – American Association of Pharmaceutical Scientists

2003 Pfizer Research Scholar Award

1998-00 McKnight Land Grant Professorship, University of Minnesota

1997 Visiting Professor - Federal University of Minas Gerias, Brazil

1996 National Science Foundation CAREER Award

1993 Texas A&M University Outstanding Graduate Research Award

1991 Society for Applied Spectroscopy Graduate Student Award

1991 ACS Division of Analytical Chemistry Graduate Fellowship Award

1991 Graduate Student Award, Houston Section, Society for Applied Spectroscopy

1989 Phi Lambda Upsilon - National Chemistry Honor Society

1988-91 National Science Foundation Predoctoral Fellow

1987-88 Fulbright Fellow - Technical University of Munich

1987 Outstanding Chemistry Student - ACS Great Plains Section

#### PROFESSIONAL SOCIETIES

Member, American Chemical Society

Member, American Association of Pharmaceutical Scientists

Member, American Association for the Advancement of Science

Member, Association of Pharmaceutical Scientists Nominations Committee, 2021-2022

Member, Council of Experts, United States Pharmacopeia, 2015-2025

Co-Chair & Co-Founder, Advanced Manufacturing of Pharmaceuticals (AMP) Alliance at Purdue University

Host, Site visit for Aprecia Pharmaceuticals Company (global leader in 3D printing of pharmaceuticals) at Purdue University

Editorial Advisory Board, *Journal of Pharmaceutical Sciences*

***INVITED LECTURES AND SEMINARS (Since 9/94)***

1. University of Wisconsin, River Falls, WI, October 1994, Talk entitled “Solid-State NMR Studies of Catalysts and Surfaces”
2. University of Minnesota, Minneapolis, MN, November 1994, Talk entitled “Recent Developments in NMR of Solids and Surfaces”
3. Augustana College, Sioux Falls, SD, February 1995, Talk entitled “Recent Developments in NMR of Solids and Surfaces”
4. University of Minnesota, Morris, MN, October 1995, Talk entitled “Solid-State NMR Spectroscopy: Applications to Inorganic and Pharmaceutical Solids”
5. 3M Corporation, November 1995, Talk entitled “Solid-State NMR Spectroscopy: Applications to Inorganic and Pharmaceutical Solids”
6. Seton Hall University, November 1995, Talk entitled “Solid-State NMR Spectroscopy: Applications to Inorganic and Pharmaceutical Solids”
7. State University of New York, Stony Brook, November 1995, Talk entitled “Solid-State NMR Spectroscopy: Applications to Inorganic and Pharmaceutical Solids”
8. Texas A&M University, College Station, TX, March 1996, Talk entitled “Solid-State NMR Studies of Poly(lactic acid) and Pharmaceuticals”
9. Nutrasweet Kelco Corporation, Deerfield, IL, May 1996, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
10. Moorhead State University, Moorhead, MN, November 1996, Talk entitled “Solid-State NMR Studies of Poly(lactic acid) and Pharmaceuticals”
11. Eastern Analytical Symposium, Somerset, NJ, November 1996, Talk entitled “Solid-State NMR Studies of Polymorphism and Chirality in Pharmaceuticals”
12. University of Wisconsin, Madison, WI, December 1996, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
13. University of South Dakota, Vermillion, SD, April 1997, Talk entitled “Solid-State NMR: Solving Problems in Chemistry, Pharmaceutics, and Agricultural Sciences”
14. Central College, Pella, IA, April 1997, Talk entitled “Solid-State NMR: Solving Problems in Chemistry, Pharmaceutics, and Agricultural Sciences”
15. South Dakota State University, Brookings, SD, Henry A. Lardy Distinguished Lecturer, April 14-15, 1997, Two talks entitled “Solid-State NMR: Solving Problems in Chemistry, Pharmaceutics, and Agricultural Sciences”, and “Conformational and Configurational Analysis of Small and Large Molecules Using NMR Spectroscopy”
16. General Mills, Inc., Minneapolis, MN, May 1997, Talk entitled “Applications of Solid-State NMR to Agricultural Products”
17. 30th Great Lakes Regional Meeting of the ACS, Chicago, IL, May 1997, Talk entitled “Fourier Transform NMR Instrument for Undergraduate and Graduate Education”
18. 30th Great Lakes Regional Meeting of the ACS, Chicago, IL, May 1997, Talk entitled “Solid-State NMR Studies of Polymorphism in Pharmaceuticals”
19. Gordon Conference on Analytical Chemistry, New England College, NH, August 1997, Poster entitled “Solid-State NMR: Solving Problems in Heterogeneous Catalysis, Pharmaceutics, and Polymers”
20. Federal University of Minas Gerias, Belo Horizonte, Brazil, August 1997, Talk entitled “Solid-State NMR: Solving Problems in Heterogeneous Catalysis, Pharmaceutics, and Polymers”
21. Petrobras, Rio de Janeiro, Brazil, September 1997, Talk entitled “Solid-State NMR: Solving Problems in Heterogeneous Catalysis, Pharmaceutics, and Polymers”
22. 3M Corporation, St. Paul, MN, December 1997, Talk entitled “Solid-State NMR Studies of Materials, including Polymers and Pharmaceuticals”
23. 215th ACS National Meeting, Dallas, TX, March 1998, Talk entitled “Characterization of Poly(lactide) Using Solution and Solid-State NMR Spectroscopy”
24. 215th ACS National Meeting, Dallas, TX, March 1998, Talk entitled “New Techniques for NMR Studies of Heterogeneous Catalysis”
25. Society for Applied Spectroscopy, Minneapolis, MN, May 1998, Talk entitled “Solid-State NMR of Pharmaceuticals”
26. Dupont Experimental Station, Wilmington, DE, May 1998, Talk entitled “In-situ NMR Characterization of Heterogeneous Catalysis in an Isolated Flow Magic-Angle Spinning Probe and High Resolution 19F Solid-State NMR Spectroscopy of Fluoropolymers”
27. Seventeenth Blue Hen NMR Symposium, University of Delaware, Wilmington, DE, June 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
28. Massachusetts Institute of Technology, Cambridge, MA, June 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
29. University of Massachusetts, Amherst, MA, June 1998, Talk entitled “Investigation of the Structure and Morphology of Poly(lactide) and Fluoropolymers Using NMR Spectroscopy”
30. University of Pittsburgh, Pittsburgh, PA, September 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
31. Ursinus College, Collegeville, PA, September 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
32. University of Missouri, Columbia, MO, October 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
33. University of Missouri, Rolla, MO, October 1998, Talk entitled “Solid-State NMR Studies of Poly(lactide) and Fluoropolymers”
34. St. Louis NMR Users Group, Washington University, St. Louis, MO, October 1998, Talk entitled “New Techniques for Solid-State NMR Studies of Heterogeneous Catalysis, Polymers, and Pharmaceuticals”
35. University of Kansas, Lawrence, KS, October 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
36. University of Alberta, Edmonton, Alberta, Canada, October 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
37. University of British Columbia, Vancouver, BC, Canada, October 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
38. 54th Southwest Regional Meeting of the ACS, Baton Rouge, LA, November 1998, Talk entitled “Understanding Defect Sites in Polymers: A 13C Solid-State NMR Study of Poly(Lactide)”
39. Purdue University, West Lafayette, IN, November 1998, Talk entitled “New Techniques for Solid-State NMR Studies of Heterogeneous Catalysis, Polymers, and Pharmaceuticals”
40. Indiana University, Bloomington, IN, November 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
41. Eli Lilly, Indianapolis, IN, November 1998, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
42. University of California, Berkeley, CA, November 1998, Talk entitled “New Techniques for Solid-State NMR Studies of Heterogeneous Catalysis, Polymers, and Pharmaceuticals”
43. Florida State University, Tallahassee, FL, December 1998, Talk entitled “New Techniques for Solid-State NMR Studies of Heterogeneous Catalysis, Polymers, and Pharmaceuticals”
44. University of Florida, Gainesville, FL, December 1998, Talk entitled “New Techniques for Solid-State NMR Studies of Heterogeneous Catalysis, Polymers, and Pharmaceuticals”
45. Georgetown University, Washington, D. C., January 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
46. University of Iowa, Iowa City, IA, February 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
47. Varian NMR Users Conference, Orlando, FL, February 1999, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
48. University of Michigan, Ann Arbor, MI, May 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
49. Michigan State University, East Lansing, MI, May 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
50. Midwest Organic Solid-State Chemistry Symposium, Indianapolis, IN, June 1999, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
51. Washington State University, Pullman, WA, August 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
52. 218th ACS National Meeting, New Orleans, LA, August 1999, Talk entitled “Development of an Isolated Flow MAS NMR System for Studies of Heterogeneous Catalysis”
53. University of Minnesota, Minneapolis, MN, October 1999, Talk entitled “New Developments in NMR Studies of Heterogeneous Catalysis”
54. University of Wisconsin, River Falls, November 1999, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
55. Argonne National Laboratory, Chicago, IL, January 2000, Talk entitled “New Developments in NMR Studies of Heterogeneous Catalysis”
56. University of Alberta, Edmonton, Alberta, Canada, February 2000, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
57. North Carolina State University, Raleigh, NC, February 2000, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
58. University of Kansas, Lawrence, KS, April 2000, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
59. E. J. Gallo, Modesto, CA, September 2000, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
60. Alza, San Francisco, CA, September 2000, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
61. Yamanouchi Pharmaceuticals, San Francisco, CA, September 2000, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
62. Genentech, San Francisco, CA, September 2000, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
63. Colorado State University, Ft. Collins, CO, November 2000, Talk entitled “Solid-State NMR Spectroscopy of Polymers and Pharmaceuticals”
64. AAPS Kansas City Local Section, Kansas City, MO, February 2001, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
65. Pittsburgh Conference on Analytical Chemistry, New Orleans, LA, March 2001, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
66. Higuchi Conference, Lake of the Ozarks, MO, March 2001, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
67. Pharmaceutical and Biomedical Analysis Meeting, Monterey, CA, May 2001, Talk entitled “Solid-State NMR of Crystalline Pharmaceuticals”
68. R. W. Johnson Pharmaceutical Research Institute, Rariton, NJ, July 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
69. University of Michigan, Ann Arbor, MI, August 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
70. Pfizer, Ann Arbor, MI, August 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
71. R. W. Johnson Pharmaceutical Research Institute, Rariton, NJ, September 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
72. Wichita State University, Wichita, KS, September 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
73. University of Kansas, Lawrence, KS, September 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
74. Second International Workshop on the Physical Characterization of Pharmaceutical Solids, Lancaster, PA, September 2001, Talk entitled “Recent Advances in Solid-State NMR Applications to Pharmaceuticals”
75. Schering Plough, Kenilworth, NJ, September 2001, Talk entitled “Solid-State NMR of Pharmaceuticals”
76. Eastern Analytical Symposium, Somerset, NJ, October 2001, Talk entitled “Solid-State NMR Spectroscopy to Characterize Polymorphism and Pseudopolymorphism in Pharmaceutical Solids”
77. Boeringer Ingelheim, Danbury, CT, February 2002, Talk entitled “Solid-State NMR of Pharmaceuticals”
78. 3M, St. Paul, MN, February 2002, Talk entitled “Solid-State NMR of Pharmaceuticals”
79. Society for Applied Spectroscopy, St. Paul, MN, February 2002, Talk entitled “Determining Structure in Polylactide Using Solution and Solid-State NMR Spectroscopy”
80. Pittsburgh Conference on Analytical Chemistry, New Orleans, LA, March 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
81. Lyondell, Philadelphia, PA, March 2002, Talk entitled “New Techniques for NMR Studies of Heterogeneous Catalysis”
82. US Pharmacopeia, Gaithersburg, MD, May 2002, Talk entitled “Solid-State NMR Study of Pharmaceuticals”
83. Polymorphism and Crystallization Conference, Philadelphia, PA, June 2002, Talk entitled “Determining Polymorphism Purity with the Identification and Quantitation of Mixtures of Drug Forms”
84. South Dakota State University, Brookings, SD, September 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
85. Quintiles, Kansas City, MO, September 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
86. University of North Carolina, Chapel Hill, NC, September 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
87. Glaxo Smith Kline, Research Triangle Park, NC, October 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
88. University of South Dakota, Vermillion, SD, October 2002, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
89. Pfizer, Groton, CT, October 2002, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
90. 37th Midwest Regional Meeting of the ACS, Lawrence, KS, October 2002, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
91. University of Kansas, Lawrence, KS, October 2002, Talk entitled “Solid-State NMR of Pharmaceuticals”
92. Drake University, Des Moines, IA, November 2002, Talk entitled “Solid-State NMR of Pharmaceuticals”
93. 225th ACS National Meeting, New Orleans, LA, March 2003, Talk entitled “Determining Stereodefect Locations in Polylactide Using Solid-State NMR Spectroscopy”
94. Bristol-Myers Squibb, New Brunswick, NJ, June 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
95. Polymorphism and Crystallization Conference, Philadelphia, PA, June 2003, Talk entitled “Determining Polymorphism Purity with the Identification and Quantitation of Mixtures of Drug Forms”
96. Bausch & Lomb, Rochester, NY, July 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
97. Schering Plough, Kenilworth, NJ, September 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
98. Polymorphism and Crystallization Conference, Brussels, Belgium, September 2003, Talk entitled “Determining Polymorphism Purity with the Identification and Quantitation of Mixtures of Drug Forms”
99. Structural Elucidation by NMR Workshop, Rutgers University, New Brunswick, NJ, October 2003, Talk Entitled “Solid-State NMR of Pharmaceuticals”
100. Emporia State University, Emporia, KS, December 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
101. Pittsburg State University, Pittsburg, KS, December 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
102. Ft. Hays State University, Ft. Hays, KS, December 2003, Talk entitled “Solid-State NMR of Pharmaceuticals”
103. Polymorphism in Crystals, ACS ProSpectives Conference Series, Tampa, FL, February 2004, Talk entitled “Analysis of Pharmaceuticals Using Solid-State NMR Spectroscopy”
104. Salt Selection Conference, Philadelphia, PA, March 2004, Talk entitled “Identification and Quantitation of Mixtures of Drug Forms”
105. Varian NMR Users Meeting, Palo Alto, CA, April 2004, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
106. Polymorphism Conference, Princeton, NJ, April 2004, Talk entitled “Form Identification and Quantitation Using Solid-State NMR Spectroscopy”
107. Oxidative Degradation and Stabilization of Pharmaceuticals Conference, Princeton, NJ, July 2004, Two talks entitled “Oxidation Reactions in the Solid State: Mechanisms and Comparison to Solution Chemistry” and “Solid-State NMR Spectroscopy of Pharmaceuticals”
108. Cephalon, West Chester, PA, July 2004, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
109. SMASH, Breckenridge, CO, September 2004, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals: Challenges and Applications”
110. Polymorphism and Crystallization Conference, Boston, MA, November 2004, Talk entitled “Identifying Form Identification and Quantitation Using Solid-State NMR Spectroscopy”
111. University of Oklahoma, Oklahoma City, OK, February 2005, Clarence Karcher Lecture, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
112. Pittsburgh Conference on Analytical Chemistry, Orlando, FL, February 2005, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
113. Pfizer, La Jolla, CA, March 2005, Talk entitled “Solid-State NMR of Pharmaceuticals”
114. 229th ACS National Meeting, San Diego, CA, March 2005, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
115. AAPS Webcast, April 2005, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
116. Albany Molecular, May 2005, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
117. Varian NMR Users Meeting, Verona, Italy, September 2005, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
118. Eastern Analytical Symposium, Somerset, NJ, November 2005, Talk entitled “Analysis of Pharmaceuticals Using Solid-State NMR Spectroscopy”
119. Eastern Analytical Symposium, Somerset, NJ, November 2005, Talk entitled “Characterization of Forced Degradation in Formulations Using Solid-State NMR Spectroscopy”
120. University of Connecticut, Storrs, CT, November 2005, Talk entitled “Solid-State NMR of Pharmaceuticals”
121. AstraZeneca, Wilmington, DE, November 2005, Talk entitled “Solid-State NMR of Pharmaceuticals”
122. City University of New York, Staten Island, NY, March 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
123. University of Missouri, Kansas City, MO, April 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
124. Augustana College, Sioux Falls, SD, April 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
125. Polymorphism and Crystallization Conference, San Diego, CA, May 2006, Talk entitled “Form Identification and Quantitation Using Solid-State NMR Spectroscopy”
126. Improving Solubility in Drug Candidates Conference, Philadelphia, PA, September 2006, Talk entitled “Drug Form Characterization after Formulation with Cyclodextrins and Other Excipients”, and Workshop entitled “Characterization and Reactivity of Solids Containing Highly Energetic Sites”
127. Amgen, La Jolla, CA, October 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
128. Merck, West Point, PA, October 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
129. Proctor & Gamble, Norwich, NY, November 2006, Talk entitled “Solid-State NMR of Pharmaceuticals”
130. Kansas State University, Manhattan, KS, February 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
131. Array Biopharma, Longmont, CO, February 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
132. University of Kentucky, Lexington, KY, March 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
133. Missouri State University, Springfield, MO, April 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
134. Ninth International Workshop on the Physical Characterization of Pharmaceutical Solids, Boston, MA, June 2007, Talk entitled “NMR Spectroscopy of Pharmaceutical Solids”
135. Vertex Pharmaceuticals, Boston, MA, June 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
136. Johnson & Johnson, Beerse, Belgium, September 2007, Talk entitled “Solid-State NMR of Pharmaceuticals”
137. Polymorphism and Crystallization Conference, Philadelphia, PA, December 2007, Talk entitled “Form Identification and Quantitation Using Solid-State NMR Spectroscopy”
138. Schering Plough, Kenilworth, NJ, March 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
139. Transform Pharmaceuticals, Boston, MA, April 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
140. Cima Pharmaceuticals, Minneapolis, MN, May 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
141. iPrime Conference, Minneapolis, MN, May 2008, Talk entitled “Advanced Solid-State Characterization of Pharmaceuticals”
142. Food and Drug Administration, Silver Springs, MD, May 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
143. Genentech, South San Francisco, CA, July 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
144. 236th ACS National Meeting, Philadelphia, PA, August 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
145. Abbott, Abbott Park, IL, August 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
146. Allergan, Irvine, CA, August 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
147. Gilead, South San Francisco, CA, August 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
148. SMASH, Santa Fe, NM, September 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
149. Johnson & Johnson, Springhouse, NJ, October 2008, Talk entitled “Solid-State NMR of Pharmaceuticals”
150. Indo-US Workshop on Pharmaceutical Co-crystals and Polymorphs, Mysore, India, February 2009, Talk entitled “Solid-State NMR Studies of Co-Crystals”
151. Polymorphism and Crystallization Conference, Boston, MA, March 2009, Talk entitled “Overcoming Physical Instability: Characterization of the Amorphous State”
152. Bristol-Myers Squibb, New Brunswick, NJ, April 2009, Talk entitled “Solid-State NMR of Pharmaceuticals”
153. AAPS Workshop on Evolving Science and Technology in Physical Pharmacy and Biopharmaceutics, Baltimore, MD, May 2009, Talk entitled “Chemical Reactions and Approaches to Improve Stability II: Solid State”
154. Boeringher Ingelheim, Danbury, CT, June 2009, Talk entitled “Solid-State NMR of Pharmaceuticals”
155. Eleventh International Workshop on the Physical Characterization of Pharmaceutical Solids, Samford, CT, June 2009, Talk entitled “Applications of Solid-State NMR Spectroscopy to Complex Matrices: Drugs, Excipients, and Formulations”
156. sanofi aventis, Bridgewater, NJ, July 2009, Talk entitled “Solid-State NMR of Pharmaceuticals”
157. University of Kentucky, Lexington, KY, August 2009, Talk entitled “Solid-State NMR of Pharmaceuticals”
158. Pfizer, Groton, CT, October 2009, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
159. Alkermes, Cambridge, MA, October 2009, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
160. AstraZeneca, Wilmington, DE, October 2009, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
161. American Association of Pharmaceutical Scientists Annual Meeting, Los Angeles, CA, November 2009, Talk entitled “Predicting Amorphous Drug Stability in Drug Formulations”
162. American Association of Pharmaceutical Scientists Annual Meeting, Los Angeles, CA, November 2009, Talk entitled “Advanced Characterization of Macromolecular Excipients”
163. The 9th Pharmaceutical Powder X-ray Diffraction Symposium, Hilton Head, SC, February 2010, Talk entitled “Solid-State Analysis of Pharmaceuticals: Solid-State NMR and PXRD”
164. Oklahoma State University, April 2010, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
165. David Grant Symposium, University of Minnesota, Minneapolis, MN, June 2010, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
166. 52nd Rocky Mountain Conference on Analytical Chemistry, Snowmass, CO, August 2010, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
167. University of Kentucky, Lexington, KY, September 2010, Talk entitled “Solid-State NMR of Pharmaceuticals”
168. Varian NMR Users Meeting, Minneapolis, MN, September 2010, Talk entitled “Solid-State NMR Spectroscopy of Pharmaceuticals”
169. Polymorphism and Crystallization Conference, Philadelphia, PA, October 2010, Talk entitled “Techniques for Form Identification and Quantitation”
170. St. Louis University, St. Louis, MO, February 2011, Talk entitled “Solid-State NMR of Pharmaceuticals”
171. Allergan, Irvine, CA, May 2011, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
172. Genentech, South San Francisco, CA, May 2011, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
173. Amgen, Thousand Oaks, CA, May 2011, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
174. University of Iowa, Iowa City, IA, June 2011, Talk entitled “Characterization of Pharmaceuticals Using Solid-State NMR Spectroscopy”
175. University of Maryland, Baltimore, MD, September 2011, Talk entitled “Characterization of Pharmaceuticals Using Solid-State NMR Spectroscopy”
176. Food and Drug Administration, Rockville, MD, October 2011, Talk entitled “Characterization of Pharmaceuticals Using Solid-State NMR Spectroscopy”
177. NIST, Gaithersburg, MD, October 2011, Talk entitled “Molecular Mobility of Pharmaceutical Amorphous Solids Probed Using SSNMR”
178. Midwest Universities Analytical Chemistry Conference, St. Louis, MO, November 2011, Talk entitled “Predicting Drug Stability Using Solid-State NMR Spectroscopy”
179. Enhancing Drug Bioavailability and Solubility, Boston, MA, January 2012, Talk entitled “Overcoming Physical Instability: Characterization of the Amorphous State”
180. AstraZeneca, Boston, MA, January 2012, Talk entitled “Characterization of Pharmaceuticals Using Solid-State NMR Spectroscopy”
181. New England NMR Meeting, Cambridge, MA, January 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
182. Webinar, AAPS, April 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
183. Abbott, Abbott Park, IL, July 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
184. University of Connecticut, Storrs, CT, September 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
185. Midwest University Analytical Chemistry Conference, Madison, WI, September 2012, Talk entitled “Quantitation with Solid-State NMR Spectroscopy”
186. Drake University, Des Moines, IA, October 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
187. Truman State University, Kirksville, MO, October 2012, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
188. 2nd Enhancing Drug Bioavailability and Solubility, Boston, MA, January 2013, Talk entitled “Overcoming Physical Instability: Characterization of the Amorphous State”
189. Millennium Pharmaceuticals, Cambridge, MA, January 2013, Talk entitled “Characterization of Pharmaceuticals Using Solid-State NMR Spectroscopy”
190. Patheon Pharmaceuticals, Cincinnati, OH, February 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
191. University of Wisconsin-Madison, March 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
192. Discovery Chemistry Congress: Formulation and Solubility, Munich, Germany, March 2013, Talk entitled “Characterization Strategies for Metastable Drug Formulations”
193. Preclinical Form and Formulation for Drug Discovery, Waterville Valley, NH, June 2013, Talk entitled “
194. Drug Formulation and Bioavailability West, San Diego, CA, June 2013, Talk entitled “Lyophilization and Emerging Drying Technologies”
195. University of Windsor, Windsor, Ontario, July 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
196. University of Michigan, Ann Arbor, MI, July 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
197. Atomic View of Biomolecular Function, Ann Arbor, MI, July 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
198. AbbVie, North Chicago, IL, July 2013, Talk entitled “Understanding Drug-Excipient Interactions in Solid Dosage Forms”
199. GlaxoSmithKline, King of Prussia, PA, October 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
200. Bristol-Myers Squibb, New Brunswick, New Jersey, October 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
201. American Chemical Society Midwest Regional Meeting, Springfield, MO, October 2013, Talk entitled “Characterization of Complex Mixtures of Polymorphic Forms Using Solid-State NMR Spectroscopy”
202. Midwest Universities Analytical Chemistry Conference, South Bend, IN, October 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
203. American Association of Pharmaceutical Scientists, San Antonio, TX, November 2013, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
204. Liquidia Pharmaceutical Company, Morrisville, NC, January 2014, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
205. ExL Pharma 3rd Drug Formulation and Bioavailability conference, Boston, MA, January 2014, Talk entitled “Overcoming Physical Stability Characterization of the Amorphous State”
206. Alkermes, Watham, MA, January 2014, Talk entitled “Center for Pharmaceutical Development- Project Update”
207. FDA, Silver Springs, MD, January 2014, Talk entitled “Solid-State NMR Studies of Pharmaceuticals”
208. University of Arkansas for Medical Sciences, Little Rock, AR, February 2014, ”Meeting Today’s Challenges in Solid-State Physical Pharmacy”
209. Hendrix College, Conway, AR, February 2014, ”Meeting Today’s Challenges in Solid-State Physical Pharmacy”
210. Allergan, Irvine, CA, April 2014, Talk entitled “Center for Pharmaceutical Development- Project Update”
211. Genentech, San Francisco, CA, April 2014, Talk entitled “Center for Pharmaceutical Development- Project Update”
212. David Grant Symposium, Minneapolis, MN, May 2014, talk entitled “Drug-excipient interactions in amorphous dispersions and tablets”
213. South Dakota State University, Brookings, SD, May 2014, talk entitled “Solid-State NMR Studies of Pharmaceuticals”
214. Gordon Research Conference on Crystal Engineering, Waterville Valley, NH, June 2014, Talk entitled “Identifying Crystal Forms in Complex Pharmaceutical Systems”
215. North Jersey ACS NMR Symposium, Rutgers University, New Brunswick, NJ, October 2014, talk entitled “New Applications of Solid-State NMR to Pharmaceuticals”
216. Bend Research, Bend, OR, October 2014, Talk entitled “Analysis of Structure and Properties of Solid Drugs, Excipients, and Dosage Forms”
217. Oregon State University, Cascades Campus, Bend, OR, October 2014, Talk entitled “Solid-State Characterization in Drug Development”
218. Gilead, Foster City, CA, October 2014, Talk entitled “Analysis of Structure and Properties of Solid Drugs, Excipients, and Dosage Forms”
219. Oral Drug Formulation Innovations Summit, San Diego, November 2014, Talk entitled “Innovations Within Characterization of Amorphous Materials to Advance Product Development”
220. AbbVie, Chicago, IL, November 2014, Talk entitled “Center for Pharmaceutical Development- Project Update”
221. Allergan, Irvine, CA, November 2014, Talk entitled “Center for Pharmaceutical Development- Project Update”
222. Pfanstiel, Chicago, IL, April 2015, Talk entitled “Characterization of Carbohydrate Excipients in the Solid State”
223. National Institute of Standards and Technology, Gaitherburg, MD, April 2015, Talk entitled “Advanced Characterization of Complex Dosage Forms to Demonstrate Product Equivalence”
224. Allergan, Irvine, CA, April 2015, Talk entitled “Understanding Drug-Excipient Interactions in Solid Dosage Form”
225. NIPTE, Rockville, MD, April 2015, Talk entitled “Evaluation of Polymorphic Changes During Tablet Manufacturing and Storage”
226. University of Puerto Rico, San Juan, Puerto Rico, May 2015, Talk entitled “Analysis of Structure Properties of Solid Drugs, Excipients, and Dosage Forms”
227. Curtis Coulter Drug Delivery Strategy: Advance Mechanisms & Product Design, Philadelphia, PA, May 2015, Talk entitled “Using Solid-State Nuclear Magnetic Resonance Spectroscopy to Study Amorphous Drug-Excipient Interactions”
228. FDA, May 2015, Talk entitled “Analysis of Structure Properties of Solid Drugs, Excipients, and Dosage Forms”
229. FDA, June 2015, Talk entitled “Advanced Characterization of Complex Dosage Forms to Demonstrate Product Equivalence”
230. AbbVie, Chicago, IL, July 2015, Talk entitled “Center for Pharmaceutical Development- Project Update”
231. Allergan, Irvine, CA, September 2015, Talk entitled “Center for Pharmaceutical Development- Project Update”
232. Genentech, San Francisco, CA, September 2015 , Talk entitled “Center for Pharmaceutical Development- Project Update”
233. Bend Research, Bend, OR, September 2015, Talk entitled “Analysis of Structure and Properties of Solid Drugs, Excipients, and Dosage Forms”
234. Food and Drug Administration, Silver Spring, MD, March 2016, Talk entitled “Advanced Characterization of Drug Substances and Drug Products”
235. Bioavailability Summit, Curtis & Coulter, Boston, MA, May 2016, Talk entitled “Investigating Amorphous Dispersions: Miscibility, Stability, and Drug-Polymer Interactions”
236. Midwest Organic Solid State Chemistry Symposium (MOSSCS), Grand Forks, ND, June 2016, Talk entitled “Identifying Crystal Forms in Complex Pharmaceutical Systems”
237. David Grant Symposium, Minneapolis, MN, June 2016, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
238. NIPTE Scientific Design of Pharmaceutical Products, Rockville, MD, October 2016, Talk entitled “Using Solid-State NMR Spectroscopy as a Predictor of Lyophilized Protein Formulation Stability”
239. qNMR Summit, Rockville, MD, October 2016, Talk entitled “SS-qNMR: Practice & Promise”
240. Curtis & Coulter Bioavailability Summit, New York, NY, January 2017, Talk entitled   
     “Oral Delivery for Biologics: Formulations and Other Potential Strategies”
241. Abbvie, Chicago, IL, January 2017, Talk entitled “Center for Pharmaceutical Development- Project Update”
242. USP, Rockville, MD, February 2017, Talk entitled “Improved Excipient Characterization Beyond the USP Monographs (functional, properties, etc.)”
243. Drug Formulation, Solubility, and Bioavailability Summit, Boston, MA, March 2017, Talk entitled “Characterization, Prediction and Excipient Selection for Amorphous Solids”
244. AAPS Bay Area Meeting, San Francisco, CA, March 2017, Talk entitled “Characterization of Polymorphs, Amorphous Solid Dispersion and Proteins in Lyophilized Formulations Using Solid-State NMR Spectroscopy”
245. Genentech, San Francisco, CA, March 2017, Talk entitled “Center for Pharmaceutical Development- Project Update”
246. Symposium on Higher Order Structure of Protein Therapeutics, Gaitherburg, MD, April 2017, Talk entitled “Characterization of Protein Stability in Lyophilized Formulations Using Solid-State NMR Spectroscopy”
247. National Biotech Conference, San Diego, CA, May 2017, Talk entitled “Miscibility in Lyophilized Protein Sugar Systems and Stability Implications”
248. NIST, Rockville, MD, June 2017, Talk entitled “Determining Local Acidity, Miscibility, and Mobility of Lyophilized Protein Formulations Using Solid-State NMR Spectroscopy”
249. 8th International Discussion Meeting on Relaxations in Complex Systems, Wisla, Poland, July 2017, Talk entitled “Characterization of Amorphous Solids Using Solid-State NMR Spectroscopy”
250. 24th Congress and General Assembly of the International Union of Crystallography, Hyderabad, India, August 2017, Talk entitled “Powder X-Ray Diffraction and Solid-State NMR Spectroscopy: Complimentary Techniques for Polymorph Identifications”
251. National Institute of Pharmaceutical Education and Research, Chandigarh, India, August 2017, Talk entitled “Determining Drug-Polymer Interactions and Phase Miscibility in Pharmaceutical Formulations”
252. Froemke Lecture, Augustana University, South Dakota, September 2017, talk entitled "What does NMR stand for again? A Chemists Journey Through Augustana College and Beyond"
253. American Association of Pharmaceutical Sciences Annual Meeting, San Diego, CA, November 2017, Talk entitled “Using H/D Exchange to Predict Protein Stability in Lyophilized Formulations”
254. Lyophilization USA, Iselin, NJ, November 2017, Talk entitled “Stability of Sugar-Protein Lyophilized Formulations: Evaluation of Phase Separation and Mobility”
255. USP, Rockville, MD, November 2017, Talk entitled “Using Solid-State NMR Spectroscopy for the Analysis of Drug Substances and Drug Products”
256. University of Windsor, Windsor, Ontario, December 2017, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
257. Purdue University, West Lafayette, IN, December 2017, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
258. PepTalk 2018, San Diego, CA, Talk entitled “Prediction of Protein Stability in Lyophilized Formulations: Miscibility, Mobility, and Microenvironmental pH”
259. Duquesne University, Pittsburgh, PA, December 2017, Talk entitled “Using Solid-State NMR Spectroscopy for the Analysis of Drug Substances and Drug Products”
260. University of Arizona, Tempe, AZ, February 2018, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
261. Tolmar, Ft. Collins, CO, March 2018, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
262. Genentech, South San Fransisco, CA, March 2018, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
263. Pearl Therapeutics, Redwood City, CA, March 2018, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
264. ExL Pharma 7th Drug Formulation, Solubility, and Bioavailability Summit, Boston, MA, March 2018, Talk Entitled “Predictive Analytics for Amorphous Solid Dispersion Stability”
265. Pharmaceutical Freeze Drying Technology, London, UK, June 2018, Talk entitled “Predicting Stability of Freeze Dried Pharmaceuticals”
266. David Grant Symposium, Minneapolis, MN, June 2018, Talk entitled “From Small Molecules to Proteins: Correlating Structure and Dynamics to Functionality”
267. Merck, West Point, PA, June 2018, Talk Entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
268. 1st International Conference on Contemporary Pharmacy Challenges: Amorphous Pharmaceuticals and Biopharmaceuticals, Wisla, Poland, September 2018, Talk entitled “Structure and Mobility in the Amorphous State Probed by Solid-State NMR Spectroscopy (and Other Techniques)”
269. Freeze Drying of Pharmaceuticals & Biologics, Garmisch-Partenkirchen, Germany, September 2018, Talk entitled “Exploring Phase Separation and Mobility in Lyophilized Formulations Using Solid-State NMR Spectroscopy”
270. Celgene, Summit, NJ, Talk Entitled “Solid-State NMR Spectroscopy: Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
271. Center for Pharmaceutical Processing Research, West Lafayette, IN, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
272. American Association of Pharmaceutical Scientists Pharm Sci 360, Washington, DC, November 2018, Talk entitled “High-Resolution Characterization of Structure, Interactions, and Miscibility of Drug Products”
273. Eastern Analytical Symposium, Plainsboro, NJ, November 2018, Talk entitled “Solid-State NMR Spectroscopy: Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
274. Genetech, South San Francisco, CA, December 2018, Talk entitled “From Small Molecules to Proteins: Correlating Structure and Dynamics to Functionality”
275. Allergan, Irvine, CA, December 2018, Talk entitled “Correlating Structure and Mobility Information to Functional Properties of Pharmaceutical Formulations”
276. Bristol-Myers Squibb, New Brunswick, NJ, February 2019, Talk entitled “Exploring Phase Separation and Mobility in Lyopholized Formulations Using Solid-State NMR Spectroscopy”
277. Food and Drug Administration (FDA), Silver Spring, MD, February 2019, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
278. Baxter, Bloomfield, IN, February 2019, Talk entitled “Exploring Phase Separation and Mobility in Lyopholized Formulations Using Solid-State NMR Spectroscopy”
279. NIBSC, London, England, March 2019, Talk entitled “Exploring Phase Separation and Mobility in Lyopholized Formulations Using Solid-State NMR Spectroscopy”
280. University of Limerick, Limerick, Ireland, March 2019, Talk entitled “From Small Molecules to Proteins: Correlating Structure and Dynamics to Functionality”
281. Janssen, Belgium, March 2019, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
282. ExL Pharma 8th Drug Formulation, Solubility, and Bioavailability Summit, Boston, MA, March 2019, Talk Entitled “Predicting Stability in Amorphous Solid Dispersion and Lyophilized Protein Formulations”
283. PQRI, Washington, DC, April, 2019, Talk Entitled “Advanced Analytical Techniques for Characterizing Amorphous Solid Dispersions”
284. Abbvie, Chicago, IL, July 2019, Talk Entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
285. Biorelevant? 2019, Boston, MA, October 2019, Talk entitled “Impact of Magnesium Stearate on Tablet Dissolution – Form Really Does Matter!”
286. Vertex Pharmaceuticals, Boston, MA, October 2019, Talk entitled “From Small Molecules to Proteins: Correlating Structure and Dynamics to Functional Properties”
287. China Pharmaceutical University, Nanjing, China, October 2019, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
288. Tsinghua University, Beijing, China, October 2019, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
289. China Pharmaceutical Conference, Yantai, China, October 2019, Talk entitled “Solid-State NMR Spectroscopy: Form Identification, Quantitation, and Applications to Drug Substances and Drug Products, Including Amorphous Solid Dispersions”
290. Genentech, South San Francisco, December 2019, Talk entitled “Predicting Stability and Dissolution in Small and Large Molecule Formulations: Evidence from Solid-State NMR Spectroscopy”
291. Bruker Virtual Presentation, West Lafayette, July 2020, Talk entitled “Correlating Structure and Mobility to Functional Properties in Pharmaceutical Formulations”
292. 3rd Annual Formulation & Drug Delivery Congress Virtual Presentation, West Lafayette, September 2020, Talk entitled “Correlating Structure and Mobility to Functional Properties in Pharmaceutical Formulations”
293. EAS, November 2020, Talk entitled “Advanced Characterization of Complex Formulations Using Solid-State Spectroscopy”
294. Curtis Coulter Conference, December 2020, Talk entitled “Innovative Methods to Characterize Amorphous Materials to Advance Product Development”
295. American Association of Pharmaceutical Scientists Pharm Sci 360, Virtual, May 2021, Talk entitled “Strategies for Enhancing the Stability of Biologics in the Solid State”
296. American Association of Pharmaceutical Scientists, Philadelphia, PA, October 2021, Talk entitled “Amorphous Solid Dispersions: Stability, Crystallinity, and Solubility”
297. Practical Applications of NMR in Industry Conference, Nashville, TN, October 2021, Talk entitled “Practical Applications of Soldi-State NMR Analysis of Pharmaceuticals”
298. Bioavailability Summit, Virtual, November 2021, Talk entitled “Innovations in the Characterization of Amorphous Materials to Advance Product Development”
299. Vertex, January 2022, Talk entitled “Polymorphs and Amorphous Solid Dispersions: Stability, Crystalinity, and Solubility”
300. IFSLD, April 2022, Talk entitled “Exploring Phase Separation and Mobility in Peptide and Protein Formulations Using Solid-Stat NMR Spectroscopy”
301. AAPS NBC, May 2022, Talk entitled “Stabilizing Solid-State mNRA Vaccines – Lessons Learned”

***PUBLICATIONS IN REFEREED JOURNALS***

1. Lazo, N. D.; White, J. L.; Munson, E. J.; Lambregts, M.; Haw, J. F. “Structure, Dynamics, and Reactivity of an Alkoxy Intermediate Formed from Acetylene on Zeolite Catalysts: An in Situ Solid-State NMR Study”, *J. Am. Chem. Soc.* **1990**, *112*, 4050.
2. Munson, E. J.; Haw, J. F. “Effects of Paramagnetic Lanthanides on the Study of Carbonaceous Deposits on Zeolite Catalysts by Carbon-13 Solid-State Nuclear Magnetic Resonance Spectroscopy”, *Anal. Chem.* **1990**, *62*, 2532.
3. Munson, E. J.; Lazo, N. D.; Moellenhoff, M. E.; Haw, J. F. “CO is Neither an Intermediate nor a Catalyst in MTG Chemistry on Zeolite HZSM-5”, *J. Am. Chem. Soc.* **1991**, *113*, 2783.
4. Munson, E. J.; Haw, J. F. “NMR Observation of Trimethyloxonium Formation from Dimethyl Ether on Zeolite HZSM-5”, *J. Am. Chem. Soc.* **1991**, *113*, 6303.
5. Lazo, N. D.; Richardson, B. R.; Schettler, P. D.; White, J. F.; Munson, E. J.; Haw, J. F. “In Situ Variable-Temperature MAS 13C NMR Study of the Reactions of Isobutylene in Zeolites HY and HZSM-5”, *J. Phys. Chem.* **1991**, *95*, 9420.
6. Munson, E. J.; Ferguson, D. B.; Kheir, A. A.; Haw, J. F. “Applications of a New CAVERN Design to the Study of Reactions on Catalysts Using in Situ Solid-State NMR”, *J. Catal.* **1992**, *136*, 504.
7. Lambregts, M. J.; Munson, E. J.; Kheir, A. A.; Haw, J. F. “13C NMR Study of Acetylene Cyclotrimerization on Platinum-Alumina Catalysts”, *J. Am. Chem. Soc.* **1992**, *114*, 6875.
8. Munson, E. J.; Kheir, A. A.; Lazo, N. D.; Haw, J. F. “In Situ Solid-State NMR Study of Methanol-to-Gasoline Chemistry in Zeolite HZSM-5”, *J. Phys. Chem.* **1992**, *96*, 7740. Correction due to printer's error: *J. Phys. Chem.* **1993**, *97*, 4248.
9. Oliver, F. G.; Munson, E. J.; Haw, J. F. “High-Temperature in Situ MAS NMR Studies of Chemical Reactions on Catalysts”, *J. Phys. Chem.* **1992**, *96*, 8106.
10. Munson, E. J.; Xu, T.; Haw, J. F. “In Situ NMR Study of Allyl Alcohol Conversion on Zeolites: Evidence for an Allyl Cation Intermediate”, *J. Chem. Soc., Chem. Commun.* **1993**, 75.
11. Munson, E. J.; Haw, J. F. “Reaction Tuning in Zeolites: An in Situ MAS NMR Study of Acetaldehyde Chemistry on HZSM-5”, *Angew. Chem.* **1993**, *32*, 615.
12. Munson, E. J.; Murray, D. K.; Haw, J. F. “Shallow-Bed CAVERN Designs for *in Situ* Solid-State NMR Studies of Catalytic Reactions”, *J. Catal.* **1993**, *141*, 733.
13. Munson, E. J.; Kheir, A. A.; Haw, J. F., “An in Situ Solid-State NMR Study of the Formation and Reactivity of Trialkylonium Ions in Zeolites”, *J. Phys. Chem.* **1993**, *97*, 7321.
14. Xu, T.; Munson, E. J.; Haw, J. F. “Toward a Systematic Chemistry of Organic Reactions in Zeolites: In Situ NMR Studies of Ketones”, *J. Am. Chem. Soc.* **1994**, *116*, 1962.
15. Haw, J. F.; Hall, M. B.; Alvarado-Swaisgood, A. E.; Munson, E. J.; Lin, Z.; Beck, L.; Howard, T. “Integrated NMR and Ab Initio Study of Acetonitrile in Zeolites: A Reactive Complex Model of Zeolite Acidity”, *J. Am. Chem. Soc.* **1994**, *116*, 7308.
16. Xu, T.; Zhang, J.; Munson, E. J.; Haw, J. F. “A Report of a Persistent Allyl Cation on HZSM-5 Zeolite Was Due to Propanal”, *J. Chem. Soc., Chem. Commun.* **1994**, 2733.
17. Lagow, R. J.; Kampa, J. J.; Wei, H.-C.; Battle, S. L.; Genge, J. W.; Laude, D. A.; Harper, C. J.; Bau, R.; Stevens, R. C.; Haw, J. F.; Munson, E. J. “Synthesis of Linear Acetylenic Carbon: The “sp” Carbon Allotrope”, *Science* **1995**, *267*, 362.
18. Gaede, H. C.; Taylor, R. E.; Munson, E. J.; Pines, A.; Song, Y.; Reimer, J. A. “High-Field Cross-Polarization NMR from Laser-Polarized Xenon to Surface Nuclei”, *Adv. Magn. Reson.* **1995**, *8*, 373.
19. Zhu, H.; Khankari, R. K.; Padden, B. E.; Munson, E. J.; Gleason, W. B.; Grant, D. J. W. “Physicochemical Characterization of Nedocromil Bivalent Metal Salt Hydrates: 1. Nedocromil Magnesium”, *J. Pharm. Sci.* **1996**, *85*, 1026-1034.
20. Thakur, K. A. M.; Kean, R. T.; Zupfer, J. M.; Buehler, N. U.; Doscotch, M. A.; Munson, E. J. “Solid-State 13C CP-MAS NMR Studies of the Crystallinity and Morphology of Poly(L-lactide)”, *Macromolecules* **1996*,*** *29*, 8844-8851.
21. Zhu, H.; Padden, B. E.; Munson, E. J.; Grant, D. J. W. “Physicochemical Characterization of Nedocromil Bivalent Metal Salt Hydrates: 2. Nedocromil Zinc”, *J. Pharm. Sci.* **1997**, *86*, 418-429.
22. Thakur, K. A. M.; Kean, R. T.; Hall, E. S.; Kolstad, J. J.; Lindgren, T. A; Doscotch, M. A.; Siepmann, J. I.; Munson, E. J. “High Resolution 13C and 1H Solution NMR Study of Poly(lactide)”, *Macromolecules* **199**7***,*** *30***,** 2422-2428.
23. Isbester, P. K.; Kestner, T. A.; Munson, E. J. “High-Resolution Variable-Temperature MAS 19F NMR Spectroscopy of Fluorocarbon Polymers”, *Macromolecules* **1997**, *30*, 2800-2801.
24. TonThat, D. M.; Ziegeweid, M.; Song, Y.-Q.; Munson, E. J.; Appelt, S.; Pines, A.; Clark, J. “SQUID Detected NMR of Laser-Polarized Xenon at 4.2 K and at Frequencies Down to 200 Hz”, *Chem. Phys. Lett.* **1997**, *272*, 245-249.
25. Holland, B. T.; Isbester, P. K.; Blanford, C. F. ; Munson, E. J.; Stein, A. “Synthesis of Ordered Aluminophosphate and Galloaluminophosphate Mesoporous Materials with Anion Echange Properties Utilizing Polyoxomette Cluster/Surfactant Salts as Precursors”, *J. Am. Chem. Soc.* **1997**, *119*, 6796-6803.
26. Thakur, K. A. M.; Kean, R. T.; Hall, E. S.; Doscotch, M. A.; Munson, E. J. “A Quantitative Method for Determination of Lactide Composition in Poly(Lactide) Using 1H NMR”, *Anal. Chem.* **1997**, *69*, 4303-4309.
27. Zhu, H.; Halfen, J. A.; Young, V. G., Jr.; Padden, B. E.; Munson, E. J.; Menon, Z.; Grant, D. J. W. “Physicochemical Characterization of Nedocromil Bivalent Metal Salt Hydrates: 3. Nedocromil Calcium”, *J. Pharm. Sci.* **1997**, *86*, 1439-1447.
28. Thakur, K. A. M.; Kean, R. T.; Hall, E. S.; Kolstad, J. J.; Munson, E. J. “1H NMR Spectroscopy in the Analysis and Characterization of Poly(Lactide)”, *Int. J. Polym. Anal. Charact.* **1998**, *4*, 379-391.
29. Thakur, K. A. M.; Kean, R. T.; Hall, E. S.; Kolstad, J. J.; Munson, E. J. “Stereochemical Aspects of Lactide Stereo-Copolymerization Investigated by 1H NMR Spectroscopy: A Case of Changing Stereospecificity”, *Macromolecules* **1998**, *31*, 1487-1494.
30. Leung, S. S.; Padden, B. E.; Munson, E. J.; Grant, D. J. W. “Hydration and Dehydration Behavior of Aspartame Hemihydrate”, *J. Pharm. Sci.* **1998**, *87*, 508-513.
31. Leung, S. S.; Padden, B. E.; Munson, E. J.; Grant, D. J. W. “Solid State Characterization of Two Polymorphs of Aspartame Hemihydrate”, *J. Pharm. Sci.* **1998**, *87*, 501-507.
32. Skoog, S. J.; Jorgenson, A.L.; Campbell, J. P.; Douskey, M. L.; Munson, E. J.; Gladfelter, W. L. “Structure and Reactivity of the Zero-Valent Ruthenium Complex Ru(1,2-bis(diphenylphosphino)ethane)(CO)3 and the Dicationic Ruthenium Dimer [Ru2(1,2-bis(diphenylphosphino)ethane)2(CO)6]2+”, *J. Organomet. Chem.* **1998**, *557*, 13-28.
33. Doscotch, M. A.; Evans, J. F.; Munson, E. J. “Fourier Transform Nuclear Magnetic Resonance Spectroscopy Experiment for Undergraduate and Graduate Students”, *J. Chem. Educ.* **1998**, *75*, 1008-1013.
34. Thakur, K. A. M.; Kean, R. T.; Zell, M. T.; Padden, B. P.; Munson, E. J. “An alternative interpretation of the HETCOR NMR spectra of poly(lactide)”, *Chem. Comm.* **1998**,1913.
35. Isbester, P. A.; Brandt, J. A.; Kestner, T. A.; Munson, E. J. “High-Resolution Variable-Temperature 19F MAS NMR Spectroscopy of Vinylidine Fluoride Based Fluoropolymers”, *Macromolecules* **1998**, *31*, 8192-8200.
36. Zell, M. T.; Padden, B. P.; Paterick, A.; Hillmyer, M. A.; Kean, R. T.; Thakur, K. A. M.; Munson, E. J. “Direct Observation of Stereodefect Sites in Semicrystalline Poly(lactide) Using 13C Solid-State NMR”, *J. Am. Chem. Soc.* **1998**, *120*, 12672-12673.
37. Holland, B. T.; Isbester, P. K.; Blanford, C. F.; Munson, E. J.; Stein, A.; “Transformation of Layered Polyoxometallate Cluster Salts into Mesoporous Materials*”, Materials Research Bulletin* **1999**, *34*, 471-482.
38. Zell, M. T.; Padden, B. E.; Grant, D. J. W.; Chapeau, M.-C.; Prakash, I.; Munson, E. J. “Two-Dimensional High-Speed CP/MAS NMR Spectroscopy of Polymorphs: 1. Uniformly 13C Labeled Aspartame”, *J. Am. Chem. Soc.* **1999**, *121*, 1372-1378.
39. Li, Z. J.; Zell, M. T.; Munson, E. J.; Grant, D. J. W. “Characterization of Racemic Species of Chiral Drugs Using Thermal Analysis, Thermodynamic Calculation, and Structural Studies”, *J. Pharm. Sci.* **1999**, *88*, 337-346.
40. Isbester, P. K.; Zalusky, A.; Lewis, D. H.; Douskey, M. C.; Pomije, M. J.; Mann, K. R.; Munson, E. J. “NMR Probe for Heterogeneous Catalysis with Isolated Reagent Flow and Magic-Angle Spinning”, *Catal. Today* **1999**, *49*, 363-375.
41. Munson, E. J.; Douskey, M. C.; De Paul, S. M.; Ziegeweid, M.; Phillips, L.; Separovic, F.; Davies, M. S.; Arony, M. J. “Variable-Temperature One- and Two-Dimensional 13C CP/MAS NMR Studies of the Dynamics of Monohaptocyclopentadienyl Rings of Hafnium nad Titanium Tetracyclopentadienyl in the Solid State”, *J. Organomet. Chem.* **1999**, *577*, 19-23.
42. Dong, Z.; Young, Jr., V. G.; Padden, B. E.; Schroeder, S. A.; Prakash, I.; Munson, E. J.; Grant, D. J. W. “Crystal Structure and Physical Characterization of Neotame Methanol Solvate”, *J. Chem. Crystallogr.* **1999**, *29*, 967-975.
43. Padden, B. E.; Zell, M. T.; Dong, Z.; Schroeder, S. A.; Grant, D. J. W.; Munson, E. J. “Comparison of Solid-State C-13 NMR Spectroscopy and Powder X-Ray Diffraction for Analyzing Mixtures of Polymorphs: 1. Neotame”, *Anal. Chem.* **1999**, *71*, 3325-3331.
44. Chen, B.; Munson, E. J. “Evidence for Two Competing Mechanisms for *n*-Butane Oxidation Catalyzed by Vanadium Phosphates”, *J. Am. Chem. Soc.*, **1999**, *121*, 11024-11025.
45. Chen, L. R.; Padden, B. E.; Vippagunta, S. R.; Munson, E. J.; Grant, D. J. W. “Nuclear Magnetic Resonance and Infrared Spectroscopic Analysis of Nedocromil Sodium Hydrates”, *Pharm. Res.* **2000**, *17*, 619-624.
46. Kaune, L. E.; Isbester, P. K.; Munson, E. J. “Study of the Conversion of Methanol to Dimethyl Ether on Zeolite HZSM-5 Using *in Situ* Flow MAS NMR”, *Solid State NMR* **2000**, *16*, 93-102.
47. Zell, M. T.; Padden, B. P.; Grant, D. J. W.; Schroeder, S. A.; Wachholder, K. L.; Prakash, I.; Munson, E. J. “Investigation of Polymorphism in Aspartame and Neotame Using Solid-State NMR Spectroscopy”, *Tetrahedron* **2000**, *56*, 6603-6616.
48. Liang, Jingmei; Ma, Yue; Chen, Bin; Munson, Eric J.; Davis, H. Ted; Binder, David; Chang, Hung-Ta; Abbas, Syed; Hsu, F.-L. “Solvent modulated polymorphism of sodium stearate crystals studied by X-ray diffraction, solid-state NMR, and cryo-SEM”, *J. Phys. Chem. B* **2001**, *105*, 9653-9662.
49. Chen, B.; Munson, E. J. “Investigation of the Mechanism of *n*-Butane Oxidation on Vanadium Phosphorus Oxide Catalysts – Evidence from Isotopic Labeling Studies”, *J. Am. Chem. Soc.* **2002**, *124*, 1638-1652.
50. Dong, Z.; Salsbury, J. S.; Padden, B. P.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Grant, D. J.W. “Neotame Anhydrate Polymorphs I: Preparation and Characterization”, *Pharm. Res.* **2002**,*19*, 330-336.
51. Zhang, G. G. Z.; Gu, C.; Zell, M. T.; Burkhardt, R. T.; Munson, E. J.; Grant, D. J. W. “Crystallization and Transitions of Sulfamerazine Polymorphs”, *J. Pharm. Sci*. **2002**, *91*, 1089-1100.
52. Dong, Z.; Salsbury, J. S.; Zhou, D.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Wight, C. A.; Grant, D. J.W. “Dehydration Kinetics of Neotame Monohydrate”, *J. Pharm. Sci.* **2002**, *91*, 1423-1431.
53. Dong, Z.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Grant, D. J. W. “Neotame anhydrate polymorphs II: Quantitation and relative physical stability”, *Pharm. Res.* **2002**, *19*, 1559-1564.
54. Dong, Z.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Grant, D. J. W. “Conformational flexibility and hydrogen-bonding patterns of the neotame molecule in its various solid forms”, *J. Pharm. Sci.* **2002**, *91*, 2047-2056.
55. Zell, M. T.; Padden, B. E.; Paterick, A. J.; Thakur, K. A. M.; Kean, R. T.; Hillmyer, M. C.; Munson, E. J. “Unambiguous Determination of the 13C and 1H NMR Stereosequence Assignments of Polylactide Using High-Resolution Solution NMR Spectroscopy”, *Macromolecules* **2002**, *35*, 7700-7707.
56. Dong, Z.; Young, Jr., V. G.; Sheth, A.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Grant, D. J. W. “Crystal Structure of Neotame Anhydrate Polymorph G”, *Pharm. Res.* **2002**, *19*, 1549-1553.
57. D’Souza, A. J.; Schowen, R. L.; Borchardt, R. T.; Salsbury, J. S.; Munson, E. J.; Topp, E. M. “Reaction of a Peptide with Polyvinylpyrrolidone in the Solid State”, *J. Pharm. Sci.* **2003**, *92*, 585-593.
58. Dong, Z.; Young, Jr., V. G.; Munson, E. J.; Schroeder, S. A.; Prakash, I.; Grant, D. J. W. “Crystal Structures of the Benzene and Ethanol Solvates of Neotame”, *J. Chem. Crystal* **2003**, *33*, 787-793.
59. Lubach, J. W.; Padden, B. E.; Winslow, S. L.; Salsbury, J. S.; Masters, D. B.; Topp, E. M.; Munson, E. J. “Solid-State NMR Studies of Pharmaceutical Solids in Polymer Matrices”, *Anal. Bioanal. Chem.* **2004**, *378*, 1504-1510.
60. Barich, D. H.; Zell, M. T.; Powell, D. R.; Munson, E. J. “2,4-Dimethoxybenzoic acid and 2,5-dimethoxybenzoic acid”, *Acta Crystallographica, Section C: Crystal Structure Communications* **2004**, *C60*, o261-o262.
61. Dong, Z.; Brennessel, W. W.; Padden, B. P.; Schroeder, S. A.; Prakash, I.; Young, Jr., V. G.; Munson, E. J.; Grant, D. J. W. “Crystal Structure and Physical Characterization of *N*-(3,3-Dimethylbutyl)-*L*-*α*-Aspartyl-*L*-Phenylalanine, The Hydrolysis Product of Neotame”, *J. Chem. Crystal.* **2005**, *35*, 233-241.
62. Sheth, A. R.; Lubach, J. W.; Munson, E. J.; Muller, F. X.; Grant, D. J. W. “Mechanochromism of Piroxicam Accompanied by Intermolecular Proton Transfer Probes by Spectroscopic Methods and Solid-Phase Changes”, *J. Am. Chem. Soc.* **2005**, *127*, 6641-6651.
63. Li, B.; O’Meara, M. H.; Lubach, J. W.; Schowen, R. L.; Topp, E. M.; Munson, E. J.; Borchardt, R. T. “Effects of Sucrose and Mannitol on Asparagine Deamidation Rates of Model Peptides in Solution and in the Solid State”, *J. Pharm. Sci.* **2005**,*94*, 1723-1735.
64. Barrón, L. B.; Waterman, K. C.; Offerdahl, T. J.; Munson, E. J.; Schöneich, C. “Reactions of aliphatic thiyl radicals in the solid state: photoisomerization of trans-4,5-dihydroxy-1,2-ditihia-cyclohexane and oxidation of dithiothreitol”, *J. Phys. Chem.* **2005**, *109*, 9241-9248.
65. Offerdahl, T. K.; Salsbury, J. S.; Dong, Z.; Grant, D. J. W.; Schroeder, S. A.; Prakash, I.; Munson, E. J. “Quantitation of Crystalline and Amorphous Forms of Anhydrous Neotame Using 13C CPMAS NMR Spectroscopy”, *J. Pharm. Sci.* **2005**, *94*, 2591-2605.
66. Nelson, B. N.; Schieber, L. J.; Barich, D. H.; Lubach, J. W.; Offerdahl, T. J.; Lewis, D. H.; Heinrich, J. P.; Munson, E. J. “Multiple-Sample Probe for Solid-State NMR Studies of Pharmaceuticals”, *Solid State NMR* **2006**, *29*, 204-213.
67. Barich, D. H.; Davis, J. M.; Schieber, L. J.; Zell, M. T.; Munson, E. J. “Investigation of Solid-State NMR Line Widths of Ibuprofen in Drug Formulations”, *J. Pharm. Sci.* **2006**, *95*, 1586-1594.
68. Barich, D. H.; Gorman, E. G.; Zell, M. T.; Munson, E. J. “3-Methylglutaric acid as a 13C solid-state NMR standard”, *Solid State NMR* **2006**, *30*, 125-129.
69. Lubach, J. W.; Xu, D.; Segmuller, B.; Munson, E. J. “Investigation of the Effects of Pharmaceutical Processing Upon Solid-State NMR Relaxation Times and Implications to Solid-State Formulation Stability”, *J. Pharm. Sci.* **2007**, *96*, 777-787.
70. Tian, F.; Middaugh, C. R.; Offerdahl, T. K.; Munson, E. J.; Sane, S.; Rytting, J. H. “Spectroscopic Evaluation of the Stabilization of Humanized Monoclonal Antibodies in Amino Acid Formulations”, *Int. J. Pharm.* **2007**, *30*, 125-129.
71. Sotthivirat, S.; Lubach, J. W.; Haslam, J.; Munson, E. J.; Stella, V. “Characterization of Prednisolone in Controlled Porosity Osmotic Pump Pellets Using Solid-State NMR Spectroscopy”, *J. Pharm. Sci*. **2007**, *96*, 1008-1017.
72. Arnold, Matthew M.; Gorman, Eric M.; Schieber, L. J.; Munson, E. J.; Berkland, C. “NanoCipro Encapsulation in Monodisperse Large Porous PLGA Microparticles”, *J. Control. Rel.* **2007**, *121*, 100-109.
73. Bailey, M. M.; Gorman, E. M.; Munson, E. J.; Berkland, C. “Pure Insulin Nanoparticle Agglomerates for Pulmonary Delivery” *Langmuir* **2008,** *24*, 13614-13620.
74. Plumley, C.; Gorman, E. M.; El-Gendy, N.; Bybee, C. R.; Munson, E. J.; Berkland, C. “Nifedipine nanoparticle agglomeration as a dry powder aerosol formulation strategy” *Int. J. Pharm.* **2009,** *369*, 136-143.
75. Johnson, Chad; Ottiger, Stefan; Pini, Ronny; Gorman, Eric M.; Nguyen, Joseph G.; Munson, Eric J.; Mazzotti, Marco; Borovik, A. S.; Subramaniam, Bala. “Near-stoichiometric O2 binding on metal centers in Co(salen) nanoparticles”,*AIChE Journal* **2009**, *55*, 1040-1045.
76. El-Bendyl, N.; Gorman, E. M.; Munson, E. J.; Berkland, C. “Budesonide Nanoparticles Agglomerates as Dry Powder Aerosols with Rapid Dissolution”, *J. Pharm. Sci*. **2009**, *98*, 2731-2746.
77. Bailey, M. M.; Mahoney, C. M.; Dempah, E.; Davis, J.; Becker, M. L.; Khondee, S.; Munson, E. J.; Berkland, C. “Fluorinated Copolymer Nanoparticles for Multimodal Imaging Applications” *Macrom. Rapid Comm.* **2010,** *31*, 87-92.
78. Chakravarty, P.; Berendt, R. T.; Munson, E. J.; Young, Jr., V. G.; Govindarajan, R.; Suryanarayanan, R. “Insights into the dehydration behavior of thiamine hydrochloride (vitamin B1) hydrates: Part I.” *J. Pharm. Sci.* **2010**, *99*, 816-827.
79. Chakravarty, P.; Berendt, R. T.; Munson, E. J.; Young, Jr., V. G.; Govindarajan, R.; Suryanarayanan, R. “Insights into the dehydration behavior of thiamine hydrochloride (vitamin B1) hydrates: Part II.” *J. Pharm. Sci.* **2010**, *99*, 1882-1895.
80. Stanton, M. K.; Kelly, R. C.; Colletti, A.; Kiang, Y. H.; Langley, M.; Munson, E. J.; Peterson, M. L.; Roberts, J.; Wells, M. “Improved pharmacokinetics of AMG 517 through co-crystallization part 1: comparison of two acids with corresponding amide co-crystals” *J. Pharm. Sci.* **2010**, *99*, 3769-3778.
81. Fu, S.; Thakur, A.; Sperger, D.; Boni, R.; Velankar, S.; Munson, E.; Block, L. “Rheological Evaluation of Inter-grage and Inter-batch Variability of Sodium Alginate” *AAPS PharmSciTech* **2010**, *11*, 1662-74.
82. Berendt, R. T.; Munson, E. J. “Detection of chiral defects in crystalline organic solids using solid-state NMR spectroscopy.” *J. Pharm. Sci.* **2011**, *100*, 1879-91.
83. Fu, S.; Thacker, A.; Sperger, D. M.; Boni, R. L.; Buckner, I. S.; Velankar, S.; Munson, E. J.; Block, L. H. “Relevance of Rheological Properties of Sodium Alginate in Solution to Calcium Alginate Gel Properties” *AAPS PharmSciTech* **2011**, *12*, 453-460.
84. Stanton, M. K.; Kelly, R. C.; Colletti, A.; Langley, M.; Munson, E. J.; Peterson, M. L.; Roberts, J.; Wells, M. “Improved pharmacokinetics of AMG 517 through co-crystallization part 2: Analysis of 12 carboxylic acid co-crystals” *J. Pharm. Sci.* **2011**, *100*, 2734-2743.
85. Sperger, D.; Fu, S.; Block, L.; Munson, E. “Analysis of Composition, Molecular Weight, and Water Content Variations in Sodium Alginate Using Solid-State NMR Spectroscopy” *J. Pharm. Sci.* **2011**, *100*, 3441-3452.
86. Maclean, J.; Medina, C.; Daurio, D.; Alvarez-Nunez, F.; Jona, J.; Munson, E.; Nagapudi, K. “Manufacture and performance evaluations of a stable amorphous complex of an acidic drug molecule and neusilin” *J. Pharm. Sci.* **2011**, *100*, 3332-3344.
87. Sperger, D. M.; Munson, E. J. “Analysis of Structural Variability in Pharmaceutical Excipients Using Solid-State NMR Spectroscopy” *AAPS PharmSciTech* **2011**, *12*, 821-833.
88. Zong, Z.; Desai, S. D.; Kaushal, A. M.; Barich, D. H.; Huang, H.-S.; Munson, E. J.; Suryanarayanan, R.; Kirsch, L. E. “The Stabilizing Effect of Moisture on the Solid-State Degradation of Gabapentin” *AAPS PharmSciTech* **2011**, *12*, 924-931.
89. Berendt, R. T.; Munson, E. J. “Effect of enantiomeric ratio and preparation method on proline crystal form” *CrystEngComm* **2012**, *14*, 2479-2488.
90. Mozziconacci, O.; Haywood, J.; Gorman, E. M.; Munson, E.; Schoeneich, C. “Photolysis of Recombinant Human Insulin in the Solid State: Formation of a Dithiohemiacetal Product at the C-Terminal Disulfide Bond” *Pharm. Res.* **2012**, *29*, 121-133.
91. Luthra, S.; Utz, M.; Gorman, E.; Pikal, M.; Munson, E.; Lubach, J. “Carbon-Deuterium Rotational-Echo Double-Resonance NMR Spectroscopy of Lyophilized Aspartame Formulations” *J. Pharm. Sci.* **2012**, *101*, 283-290.
92. Gorman, E. M.; Samas, B.; Munson, E. J. “Understanding the Dehydration of Levofloxacin Hemihydrate” *J. Pharm. Sci.* **2012**, *101*, 3319-3330.
93. Marinaro, W. A; Schieber, L. J.; Munson, E. J.; Day, V. W.; Stella, V. J. “Properties of a Model Aryl Boronic Acid and its Boroxine”, *J. Pharm. Sci.* **2012**, *101*, 3190-3198.
94. Dempah, K. E.; Barich, D. H.; Kaushal, A. M.; Zong, Z.; Desai, S. D.; Suryanarayanan R.; Kirsh, L.; Munson, E. J. “Investigating gabapentin polymorphism using solid-state NMR spectroscopy” *AAPS PharmSciTech* **2013,** *14,* 19-23.
95. Calahan, J. H.; Zanon, R. L.; Alvarez-Nunez, F.; Munson, E. J.; “Isothermal microcalorimetry to investigate the phase separation for amorphous solid dispersions of AMG 517 with HPMC-AS” *Molecular Pharm.* **2013,** *10,* 1949-57.
96. Wang, H.; Sheehan, C.; Block, H.; Moreton, Richard; Wendt, R; Apte, S.P.; Munson, E.J. “Fixed-oil excipient monographs development of USP fixed-oil reference standards” *Pharm. Tech.* **2013**, *37,* 102-108.
97. Pyszczynski, S. J.; Munson, E. J.; “Generation and Characterization of a New Solid Form of Trehalose” *Molecular Pharm.* **2013**, *10,* 3323-3332**.**
98. Yuan, X.; Sperger, D.; Munson, E.J. “Investigating Miscibility and Molecular Mobility of Nifedipine-PVP Amorphous Solid Dispersions Using Solid-State NMR Spectroscopy” *Molecular Pharm*., **2014**, *11*, 329-337.
99. Calahan, J.L.; Azali, S.C.; Munson, E.J.; Nagapudi, K. “Investigation of Phase Mixing in Amorphous Solid Dispersions of AMG 517 in HPMC-AS Using DSC, Solid-State NMR, and Solution Calorimetry” *Molecular Pharm.,* **2015,** *12,* 4115-4123.
100. Yuan, X.; Xiang, T.-X.; Anderson, B.; Munson, E.J. “Hydrogen Bonding Interactions in Amorphous Indomethacin and Its Amorphous Solid Dispersions with Poly(vinylpyrrolidone) and Poly(vinylpyrrolidone-co-vinyl acetate) Studied Using 13C Solid-State NMR” *Molecular Pharm.,* **2015,** *12,* 4518-4528.
101. Haware, R.V.; Dave, V.S.; Kakarala, B.; Delaney, S.; Staton, S.; Munson, E.; Gupta, M.R.; Stagner, W.C.; “Vegetable-derived magnesium stearate functionality evaluation by DM(3) approach” *Eur J Pharm Sci.,* **2016,** *89,*  115-124.
102. Mensink, M.A.; Nethercott, M.; Hinriches, W.L.; van der Voort Maarschalk, K.; Frijlink, H.W.; Munson, E.J.; Pikal, M.J. “Influence of Miscibility of Protein-Sugar Lyophilizates on Their Storage Stability” *AAPS J***, 2016.**
103. Jennings, J.A.; Parkin, S.; Munson, E.; Delaney, S.P.; Calahan, J.L.; Isaacs, M.; Hong, K.; Crocker, M. “Regioselective Baeyer-Villiger oxidation of lignin model compounds with tin beta zeolite catalyst and hydrogen peroxide”, *RSC Advances*, **2017**, *7*, 25987-25997.
104. Tang, S.; Bhandari, R.; Delaney, S.P.; Munson, E.J.; Dziubla, T.D.; Hilt, J.Z. “Synthesis and characterization of thermally responsive N-isopropylacrylamide hydrogels copolymerized with novel hydrophobic polyphenolic crosslinkers” *Materials Today Comm.*, **2017**, *10*, 46-53.
105. Delaney, S.P.; Nethercott, M.J.; Mays, C.J.; Winquist, N.T.; Arthur, D.; Calahan, J.L.; Sethi, M.; Pardue, D.S.; Kim, J.; Amidon, G.; Munson, E.J. “Characterization of Synthesized and Commercial Forms of Magnesium Stearate Using Differential Scanning Calorimetry, Thermogravimetric Analysis, Powder X-Ray Diffraction, and Solid-State NMR Spectroscopy”, *J. Pharm. Sci.*, **2017**, *106*, 338-347.
106. Dempah, K.E.; Lubach, J.W.; Munson, E.J. “Characterization of the Particle Size and Polydispersity of Dicumarol Using Solid-State NMR Spectroscopy” *Molecular Pharm.*, **2017**, *14*, 856-865. (Correction for lead author, **2017**, *14*, 1319-1319).
107. Kalra, A., Tishmack, P., Lubach, J., Munson, E., Taylor, L., Byrn, S., & Li, T. “Impact of Supramolecular Aggregation on the Crystallization Kinetics of Organic Compounds from the Supercooled Liquid State” *Molecular Pharmaceutics,* **2017**, *14,* 2126-2137.
108. Hanrahan, M., Venkatesh, A., Carnahan, S., Calahan, J., Lubach, J., Munson, E., & Rossini, A. “Enhancing the resolution of 1H and C solid-state NMR spectra by reduction of anisotropic bulk magnetic susceptibility broadening.” *Physical Chemistry Chemical Physics* : PCCP, **2017**, *19* (41), 28153-28162.
109. Kalra, A., Lubach, J. W.; Munson, E. J.; Li, T. “Exploring Molecular Speciation and Crystallization Mechanism of Amorphous 2-Phenylamino Nicotinic Acid” *Pharm. Res*., **2018**, *35*, 51.
110. Dachavaram, S. S.; Penthala, N. R.; Calahan, J. L.; Munson, E. J.; Crooks, P. A. “Highly sulphated cellulose: a versatile, reusable and selective desilylating agent for deprotection of alcoholic TBDMS ethers”, *Organic Biomolecular Chem*., **2018**, *16*, 6057-6062.
111. Honick, M.; Sarpal, K.; Alayoubi, A.; Zidan, A.; Hoag, S. W.; Hollenbeck, R. G.; Munson, E. J.; Polli, J. E. “Utility of Films to Anticipate Effect of Drug Load and Polymer on Dissolution Performance from Tablets of Amorphous Itraconazole Spray-Dried Dispersions” *AAPS PharmSciTech*, **2019**, *20*, Article Number: 331.
112. Sarpal, K.; Delaney, S.; Zhang, G. G. Z.; Munson, E. J. “Phase Behavior of Amorphous Solid Dispersions of Felodipine: Homogeneity and Drug-Polymer Interactions” *Mol. Pharm.* **2019**, *16*, 4836-4851.
113. Dachavaram, S. S.; Moore, J. P.; Bommagani, S.; Penthala, N. R.; Calahan, J. L.; Delaney, S. P.; Munson, E. J.; Batta-Mpouma, J.; Kim, J. W.; Hestekin, J. A.; Crooks, P. A. “A Facile Microwave Assisted TEMPO/NaOCl/Oxone (KHSO5) Mediated Micron Cellulose Oxidation Procedure: Preparation of Two Nano TEMPO-Cellulose Forms” *Starch*, **2020**, *72*, Article Number: 1900213.
114. Sarpal, K.; Tower, C; Munson, E. J. “Investigation into Intermolecular Interactions and Phase Behavior of Binary and Ternary Amorphous Solid Dispersions of Ketoconazole” *Mol. Pharm.* **2020**, *17*, 787-801.
115. Jarrells, T. W.; Zhang, D.; Li, S.; Munson, E. J. “Quantification of Monomer Units in Insoluble Polymeric Active Pharmaceutical Ingredients Using Solid-State NMR Spectroscopy I: Patiromer” *AAPS PharmSciTech*, **2020**, *21*, Article Number: 116.
116. Calahan, J. L.; Paul, S.; Yanez, E. G.; DeNeve, D.; Sun, C. Q. C.; Munson, E. J. “The impact of solid-state form, water content, and surface area of magnesium stearate on lubrication efficiency, tabletability, and dissolution” *Pharm. Dev. Tech.*, **2021**, *26*, 150-156.
117. Hancock, M. L.; Yokel, R. A.; Beck, M. J.; Calahan, J. L.; Jarrells, T. W.; Munson, E. J.; Olaniyan, G. A.; Grulke, E. A. “The characterization of purified citrate-coated cerium oxide nanoparticles prepared via hydrothermal synthesis” *App. Surf. Sci.*, **2021**, *535*, Article Number: 147681.
118. Li, M.; Koranne, S.; Fang, R.; Lu, XY.; Williams, D. M.; Munson, EJ.; Bhambhani, A.;Su, YC. “Probing Microenvironmental Acidity in Lyophilized Protein and Vaccine Formulations Using Solid-state NMR Spectroscopy” *J. Pharm. Sci.*, **2021**, *110*, *3,* 1292-1301.
119. Sarpal, K.; Munson, EJ; “Amorphous Solid Dispersions of Felodipine and Nifedipine with Soluplus (R): Drug-Polymer Miscibility and Intermolecular Interactions” *J. Pharm. Sci.,* **2021**, *110*, 4, 1457-1469.
120. Chen, Y.; Ling, J.; Li, M.; Su, Y.; Arte, K.; Mutukuri, T.; Taylor, L.; Munson, E.; Topp, E.; Zhou, Q. “Understanding the Impact of Protein-Excipient Interactions on Physical Stability of Spray-Dried Protein Solids” *Molecular Pharmaceutics,* **2021**, *18*, 7, 2657-2668.
121. Zhou, Q.; Munson, E.; “Advances in Solid Formulation of Pharmaceutical Biologics” Advanced Drug Delivery Reviews, **2021**,  *175,* 113827.
122. Bhujbal, S.; Su, Y.; Pathak, V.; Zemlyanov, D.; Cavallaro, A.; Munson, E.; Taylor, L.; Zhou, Q.; “Effect of Storage Humidity on Physical Stability of Spray-Dried Naproxen Amorphous Solid Dispersions with Polyvinylpyrrolidone: Two Fluid Nozzle vs. Three Fluid Nozzle” *Pharmaceutics*, **2021**, *13*, 7, 1074.
123. Lu, X.; Li, M.; Arce, F.; Ling, J.; Setiawan, N.; Wang, Y.; Shi, X.; Campbell, H.; Nethercott, M.; Xu, W.; Munson, E.; Marsac, P.; Su, Y.; “Mechanistic Investigation of Drug Supersaturation in the Presence of Polysorbates as Solubilizing Additives by Solution Nuclear Magnetic Resonance Spectroscopy” *Molecular Pharmaceutics*, **2021**, *18*, 12, 4310-4321.
124. Chen, Y.; Moseson, D.; Richard, C.; Swinney, M.; Horava, S.; Oucherif, K.; Cox, A.; Hawkins, E.; Li, Y.; DeNeve, D.; Munson, E.; et al. “Development of Hot-Melt Extruded Drug/Polymer Matrices for Sustained Delivery of Meloxicam” *Journal of Controlled Release*, **2022**, *342*, 189-200.

***INVITED PAPERS***

1. Isbester, P. K.; Kaune, L.; Munson, E. J. “Magic-angle spinning NMR: A window into flow catalytic reactors”, *CHEMTECH*, November **1999**.
2. Offerdahl, T. K.; Munson, E. J. “Solid-State NMR Spectroscopy”, McGraw-Hill Yearbook of Science and Technology, 2003.
3. Offerdahl, T. K.; Munson, E. J. “Solid-State NMR Spectroscopy of Pharmaceutical Materials”, *American Pharmaceutical Review*, **2004**, *7*, 109-112.
4. Berendt, R. T.; Sperger, D. M.; Munson, E. J.; Isbester, P. K. “Solid-state NMR spectroscopy in pharmaceutical research and analysis” *TrAC, Trends in Analytical Chemistry*, **2006**, *25*, 977-984.
5. Newman, A.; Munson, E. “Characterizing miscibility in amorphous solid dispersions”, *American Pharmaceutical Review***, 2012**,*15,* 92-98.
6. Munson, E. J. “Solid-state NMR spectroscopy of drug substances and drug products: an overview”, *European Pharmaceutical Review*, **2020**, *25,*5, 10-13.

***BOOK CHAPTERS***

1. Barich, D. H.; Zell, M. T.; Munson, E. J. “Physicochemical Properties, Formulation, and Drug Delivery”, *Frontiers of Biotechnology & Pharmaceuticals*, v. 4, **2003**.
2. Munson, E. J.; Lubach, J. W. “Solid-State NMR in the Characterization of Pharmaceutical Formulations”, *Encyclopedia of Pharmaceutical Technology*, **2005**.
3. Lubach, J. W.; Munson, E. J. “Solid-state NMR Spectroscopy”, *Polymorphism in the Pharmaceutical Industry*, **2005**.
4. Gorman, E. M.; Padden, B. E.; Munson, E. J., Stability: physical and chemical. *Preclin. Dev. Handb.: ADME Biopharm. Prop.* **2008**, 545-570.

#### PATENTS

1. Schieber, L. J.; Offerdahl, T. K.; Munson, E. J. “Multiple Sample NMR Probe”, patent issued 8/30/05 (U.S. patent 6,937,020).
2. Barich, D. H.; Nelson, B. N.; Munson, E. J. “High Throughput Systems for Magic-Angle Spinning Nuclear Magnetic Resonance”, patent issued 8/09 (U.S. patent 7626391B2).
3. Munson, E. J.; Nethercott, M. J. “Static multiple-sample NMR probe”, patent issued 6/18 (U.S. patent 9,995,801).