

CURRICULUM VITAE

Hou-min Chang

ADDRESS

HOME 3410 Redbud Lane, Raleigh, North Carolina, 27607
TEL: (919) 787-4183 FAX: (347) 426-0497

OFFICE: Department of Wood and Paper Science
Box 8005, North Carolina State University
Raleigh, North Carolina 27695-8005
TEL: (919) 515-7712 FAX: (919) 515-6302

PERSONAL DATA:

BORN: August 29, 1938 in Taiwan, China
MARITAL STATUS: Married, two children
CITIZENSHIP: U.S.A. (Naturalized in October 1972)

HIGHER EDUCATION:

National Taiwan University	Forestry	B. Ag.	1962
University of Washington	Organic Chemistry	M.S.	1966
University of Washington	Wood Chemistry	Ph.D.	1968

EMPLOYMENT:

1965-1968 Research Assistant - University of Washington
1968-1969 Postdoctoral Fellow - North Carolina State University
1969-1973 Assistant Professor - North Carolina State University
1973-1977 Associate Professor - North Carolina State University
1976 Scientific Specialist - Weyerhaeuser Company (on leave from NCSU)
1977-1990 Professor - North Carolina State University
1981 Visiting Professor - University of Tokyo, Japan (on leave from NCSU)
1998 Visiting Professor - Kyoto University, Japan (on leave from NCSU)
1990 -2005 Reuben B. Robertson Distinguished Professor of Pulp and Paper Science and
Technology, North Carolina State University
2005 to date Professor Emeritus, North Carolina State University
2006 to date Special Professor, Nanjing Forestry University (3 months per year at NJFU)

SOCIETY MEMBERSHIPS AND ACTIVITIES:

American Chemical Society, Sigma Xi, TAPPI, Xi Sigma Pi, Phi Kappa Phi,
TAPPI : Chairman, Wood Chemistry Committee 1980-81; Board of Directors, 1999-2002
ACS: Program Chairman, Cellulose, Paper & Textile Division 1979-81

HONORS:

Sigma Xi Research Award 1974 Fellow, International Academy of Wood Science, 1982 NCSU
Alumni Association Outstanding Research Award, 1985
TAPPI Research and Development Division Technical Award, 1992
NCSU Alumni Association Alumni Distinguished Professor for Graduate Teaching, 1993, 1994
TAPPI Fellow, 1999
Notable Achievement Award, International Symposium on Wood, Pulp and Fiber Chemistry,
2007

LIST OF PUBLICATIONS

US PATENTS

1. Jividen, G. M., H-m Chang, R. H. Reeves, and C. L. Chen, 1978, Process for Obtaining Seed Hull Commodities Including Cellulosic Fibers and Xylitol, US Patent 4,087,316.
2. Eaton, D. C., T. K. Kirk and H-m Chang, 1983, Process for the Decolorization of Pulp Mill Bleach Plant Effluent, US Patent 4,420,369.
3. Chang, H-m., V. B. Huynh, T. W. Joyce and T. K. Kirk, 1985, Process of Degrading Chlorinated Organics by White-Rot Fungus, US Patent 4,554,075.
4. Chang, H-m., T. W. Joyce and T. K. Kirk, 1987, Process of Treating Effluent from a Pulp or Papermaking Operation, US Patent 4,655,926.
5. Chang, H-m., H. Jameel and G. E. Seger, 1993, High Efficiency Two Step, High Low pH Chlorine Dioxide Pulp Bleaching Process, US Patent 5,268,075
6. Chang, H-m., Tien-Wang Wu, and J. A. Heitmann, 1996, Deinking of Xerographic Printed Wasterpaper Using Long Chain Alcohol, US Patent 5,500,082
7. Chang, H-m., H. Jameel, J-F. Song, D. Pan, B. Amini, JR. Webster and B. E. Evans, 1996, Process for Preparing a Bleaching Liquor Containing Percarboxylic and Caro's Acid, US Patent 5,589,032
8. Chang, H-m., H. Jameel, J-F. Song, D. Pan, B. Amini, JR. Webster and B. E. Evans, 1997, Method of Oxidatively Treating a Substrate with an Equilibrium Mixture of Caro's Acid and a Percarboxylic Acid, US Patent 5,693,185

BOOKS EDITED

1. Kirk, T. K., T. Higuchi, and H-m. Chang, Editors, Vol. I & II, 1980, Lignin Biodegradation: Microbiology, Chemistry and Potential Applications, CRC Press, Inc., Boca Raton, Florida.
2. Higuchi, T., H-m. Chang, and T. K. Kirk, 1983, Recent Advances in Lignin Biodegradation Research, Uni Publishers Co., Ltd., Tokyo, Japan.
3. Kirk, T. K. and H-m. Chang, 1990, Biotechnology in Pulp and Paper Manufacture, Applications and Fundamental Investigations, Butterworth-Heinemann, Boston, MA.

BOOK CHAPTERS

1. Chang, H-m. and G. G. Allan, Oxidation, In "Lignins" Edited by K. V. Sarkanen and C. H. Ludwig, Wiley-Interscience, New York, **1971**, 433-485.
2. Chang, H-m., C. L. Chen, and T. K. Kirk, **1980** Chemistry of Lignin Degraded by White-Rot Fungi, in Lignin Biodegradation: Microbiology, Chemistry and Potential Applications, edited by T. K. Kirk, T. Higuchi and H-m. Chang, CRC Press, Inc., Boca Raton, Florida, Vol. I, pp. 215-229.

3. Kirk, T. K., T. Higuchi, and H-m. Chang, **1980**, Lignin Biodegradation: Summary and Perspectives in "Lignin Biodegradation: Microbiology, Chemistry and Potential Application" edited by T. K. Kirk, T. Higuchi and H-m. Chang, CRC Press, Inc., Boca Raton, Florida, Vol. II, pp. 235-243.
4. Chang, H-m., and J. S. Gratzl, **1980**, Ring Cleavage Reactions of Lignin Models with Oxygen and Alkali, in Chemistry of delignification with Oxygen, Ozone, and Peroxides, edited by J. S. Gratzl, J. Nakano and J. P. Singh, Uni Publishers Co., Tokyo, Japan, pp. 151-163.
5. Tai, D., M. Terazawa, C. L. Chen, H-m. Chang and T. K. Kirk, **1983**, Biodegradation of Guaiacyl and Guaiacyl-Syringyl Lignins in Wood by Phanerochaete chrysosporium, in "Recent Advances in Lignin Biodegradation Research", edited by T. Higuchi, H-m. Chang and T.K. Kirk, Uni Publishers Co., Ltd., Tokyo, Japan, pp. 44-63.
6. H-m. Chang, T. W. Joyce, and A. G. Campbell, E. D. Gerrard, Van-Ba Huynh, and T. K. Kirk, **1983**, Fungal Decolorization of Bleach Plant Effluents, in "Recent Advances in Lignin Biodegradation Research", edited by T. Higuchi, H-m. Chang and T. K. Kirk, Uni Publishers, Co., Ltd., Tokyo, Japan, pp. 257-268.
7. Joyce, T. W., H-m. Chang, A. G. Campbell, Jr., E. D. Gerrard and T. K. Kirk, **1984**, A Continuous Biological Process to Decolorize Bleach Plant Effluents, Biotech. Adv. Vol. 1, pp. 301-308 (Pergamon Press Ltd., London).
8. Chen, C.-L., and H-m. Chang, **1985**, Chemistry of Lignin Biodegradation, in Biosynthesis and Biodegradation of Wood Components edited by T. Higuchi, Academic Press, Inc., New York, NY, pp. 535-556.
9. Guo, H., H-m. Chang, T. W. Joyce and J. Glaser, **1990**, Degradation of Chlorinated Phenols and Guaiacols by the White-Rot Fungus Phanerochaete chrysosporium, in Biotechnology in Pulp and Paper Manufacture, Applications and Fundamental Investigations, edited by T. K. Kirk and H-m., Chang, Butterworth-Heinemann, Boston, MA, pp. 223-230.
10. Yin, C.-F., T. W. Joyce, and H-m. Chang, **1990**, Dechlorination of Conventional Bleaching Effluent by Sequential Biological Treatment, in Biotechnology in Pulp and Paper Manufacture, Applications and Fundamental Investigations, edited by T. K. Kirk and H-m. Chang, Butterworth-Heinemann, Boston, MA, pp. 231-244.
11. Kirk, T. K., and H-m. Chang, **1990**, Overview of Biotechnology in Pulp and Paper Manufacture, in Biotechnology in Pulp and Paper Manufacture, Applications and Fundamental Investigations, edited by T. K. Kirk and H-m. Chang, Butterworth-Heinemann, Boston, MA, pp. 1-13.
12. Sederoff, R. and H-m. Chang, **1991**, Lignin Biosynthesis, in Wood Structure and Composition edited by M. Lewin and I. S. Goldstein, Marcel Dekker, Inc., New York, NY, pp. 263-285.
13. Chang, H-m., **1992**, Isolation of Lignin from Pulp, in Methods in Lignin Chemistry edited by S. Y. Lin and C. W. Dence, Springer-Verlag, Berlin Heidelberg, pp.71-74

14. Fukui, H., T. L. Presnell, T. W. Joyce and H-m. Chang, **1992**, Declorization and Detoxification of Kraft Ep Effluent by *Phanerochaete chrysosporium*, in Biotechnology in Pulp and Paper Industry edited by M. Kuwahara and M. Shimada, UNI Publishers Co., Ltd., Tokyo, pp.75-80
15. Chang, H-m., and R. L. Farrell, **1996**, The Effect of Xylanase Treatment on the Bleachability of softwood and Hardwood Kraft Pulps, Biotechnology in the Pulp and Paper Industry, Recent Advances in Applied and Fundamental Research, E. Srebotnik and K. Messner, Editors, Facultas Universitatisverlag, Vienna, Austria, pp. 75-80
16. R. A. Venditti, H-m. Chang, R. D. Gilbert, **1999**, Stickies Measurement Based on Deposition Used at North Carolina State University, in "Paper Recycling Challenge: Volume IV, Process Control & Mensuration", Ed. M. Doshi and J. Dyer, Progress in Paper Recycling, Appleton WI, pp. 103-104
17. Kadla, J. F., and H-m. Chang, **2001**, Reaction of Peroxides with Lignin and Lignin Model Compounds, in Oxidative Delignification Chemistry: Fundamentalas and Catalysis, D. S. Agrypoulos, editor, ACS Symposium Series 785, Am. Chme. Society, Wash. DC, pp. 108-129
18. Venditti, R. A., B. E. Lucas, X. Huo, H. Jameel and H-m. Chang, **2002**, Paper Recycling Factors Affecting the Screening of Pressure Sensitive Adhesives, in Recent Advances in Paper Recycling – Stickies, M. R. Doshi, Editor, Doshi & Associate, Inc., Appleton, WI, 2002, pp.126-133
19. Balakshin, M. Y., E. A. Capanema and H-m. Chang, **2008**, Recent Advances in the Isolation and Analysis of Lignin and Lignin-Carbohydrate Complexes, in Characterization of Lignocellulosic Masterials, T. Q. Hu, editor, Blackwell Publishing, Ames, IW, 2008, pp. 148-170

PUBLICATIONS IN REFEREED JOURNALS

1. Allan, G. G., H-m. Chang, and K. V. Sarkanen, **1967**, A Rapid Method for Determination of Infrared SPectra of Water-Free Polymers, *Chemistry and Industry*, 699-700.
2. Sarkanen, K. V., H-m. Chang, and B. Ericsson, 1967. Species Variation in Lignins I. Infrared Spectra of Guaicyl and Syringyl Models, *Tappi* 50 (11): 572-575.
3. Sarkenens, K. V., H-m. Chang, and G. G. Allan, 1967, Species Variation in Lignins II. Conifer Lignins, *Tappi* 50 (12): 583-587.
4. Sarkenens, K. V., H-m. Chang, and G. G. Allan, 1967, Species Variation in Lignins III. Hardwood Lignins, *Tappi* 50 (12): 587-590.
5. Kleppe, P. J., H-m. Chang, and R. C. Eckert, 1972, Delignification of High Yield Pulp with Oxygen and Alkali: Preliminary Studies on Southern Pines, *Pulp Paper Mag. Can.* 73 (23): T400.
6. Chang, H-m. and P. J. Kleppe, 1973, Delignification of High Yield Pulp with Oxygen and Alkali: Southern Pine Kraft Pulp, *Tappi* 56 (1): 97-100.

7. Chang, H-m., W. T. McKean, and S. Seay, 1973, Delignification of High Yield Southern Pine Soda Pulps by Oxygen and Alkali, *Tappi* 56 (5): 105-108.
8. Chang, H-m. and K. V. Sarkanen, 1973, Species Variation in Lignin: Effect of Species on the Rate of Kraft Delignification, *Tappi* 56 (3): 132-134.
9. Eckert, R. C., H-m. Chang, and W. P. Tucker, 1973, Oxidative Degradation of Phenolic Lignin Model Compounds with Oxygen and Alkali, *Tappi* 56 (6): 134-138.
10. Chang, H-m., W. T. McKean, J. S. Gratzl, and C. K. Lin, 1973, Delignification of High Yield Southern Pine Soda Pulps with Oxygen and Alkali: Effects of Temperature and Alkali Charge, *Tappi* 56 (9): 116-119.
11. Eckert, R. C., H-m. Chang and W. P. Tucker, 1974, Novel Products from Oxidation of Hindered Phenols with One-Electron-Transfer Oxidants, *J. Org. Chem.* 39: 718-720.
12. Chang, H-m., J. S. Gratzl and W. T. McKean, 1974, Delignification of High-Yield Pulps with Oxygen and Alkali; Progress and Prospects, *Tappi* 57 (5): 123-126.
13. Chang, H-m, W. T. McKean, and J. S. Gratzl, 1974, Der Holzaufschlu mit Alkali and Sauerstoff: Praktische und theoretische Untersuchungen, *Das Papier* 28 (10A): V17-24.
14. Kirk, T. K. and H-m. Chang, 1974, Decomposition of Lignin by White-rot Fungi I. Isolation of Heavily Degraded Lignins from Decayed Spruce, *Holzforschung* 28 (6): 217-222.
15. Kirk, T. K. and H-m. Chang, 1975, Decomposition of Lignins by White-rot Fungi II. Characterization of Heavily Degraded Lignins from Decayed Spruce, *Holzforschung* 29 (2): 56-64.
16. Kirk, T. K., H-m. Chang, and L. F. Lorenz, 1975, Topochemistry of the Fungal Degradation of Lignin in Birch Wood as Related to the Distribution of Guaiacyl and Syringyl Lignins, *Wood Science and Technology* 9: 81-86.
17. Chang, H-m., E. B. Cowling, W. Brown, E. Adler, and G. Miksche, 1975, Comparative Studies on Cellulolytic Enzyme Lignin and Milled Wood Lignin of Sweetgum and Spruce, *Holzforschung* 29 (5): 153-159.
18. Chen, C-L., H-m. Chang, and E. B. Cowling, 1976, Aporphine Alkaloids and Lignins in Heartwood of *Liriodendron tulipifera*, *Phytochemistry* (15): 547-550.
19. Chen, C-L., H-m. Chang, E. B. Cowling, C-Y.H. Hsu, and R.P. Gates, 1976, Aporphine Alkaloids and Lignins Formed in Response to Injury of Sapwood in *Liriodendron tulipifera*, *Phytochemistry* (15): 1161-1167.
20. Chang, H-m., J. S. Gratzl, W. T. McKena, R. H. Reeves, and V. E. Stockman, 1976, Some Sheet Properties of Soda Oxygen Pulps, *Tappi* 59 (8): 76-75.
21. Chang, H-m., D. W. Goheen, J. Marton, I. A. Pearl, and J. F. Saeman, 1976, Highlights in Wood-related Literature for 1975, *Tappi* 59 (7): 87.

22. Chen, C.-L., H-m. Chang, and T. K. Kirk, 1977, Betulachrysoquinone Hemiketal: A p-Benzoquinone Hemiketal Macrocylic Compound Produced by *Phanerochaete chrysosporium*, *Phytochemistry* 16: 1983.
23. Chen, C-L. and H-m. Chang, 1978, Lignins and Aporphine Alkaloids in Bark of *Liriodendron tulipifera*, *Phytochemistry* 17, 779-782.
24. Chang, H-m., W. J. Connors, C. W. Dence, and J. F. Saeman, 1979, Highlights in Wood-related Literature for 1978, *Tappi* 62 (7): 63-65.
25. Evans, J. E., V. Venkatesh, J. S. Gratzl, and H-m. Chang, 1979, The Kinetics of low Consistency Oxygen Delignification: Kraft and Soda-Anthraquinone Pulps, *Tappi* 62 (6): 37-39.
26. Chang, H-m., J. D. Sinky, and J. F. Yan. 1979. Chemical Analysis of Refiner Pulps, *Tappi* 62 (9): 103-106.
27. Chang, H-m. 1980 Oxygen Bleaching--Present Status and Future Prospects, *Pulp and Paper*, March, 1980, pp. 87-91.
28. Eaton, D., H-m. Chang, and T. K. Kirk, 1980, Fungal Decolorization of Kraft Bleach Plant Effluents. *Tappi* 63 (10): 103-106.
29. Sundman, G., T. K. Kirk, and H-m. Chang, 1981, Fungal Decolorization of Kraft Bleach Plant Effluent: Fate of the Chromophoric Material. *Tappi* 64 (9): 145-148.
30. Kirk, T. K., H-m. Chang, 1981, Potential Applications of Bio-lignolytic Systems, *Enzyme Microb. Technol.* 3 (17): 189-196.
31. Belt, P. B., T. W. Joyce, and H-m. Chang, 1981, Environmental Aspects of Some Alternative Pulp Bleaching Techniques, Water Resources Research Institute of the University of North Carolina, Report No. 175.
32. Chen, C. L., H-m. Chang, and T. K. Kirk, 1982, Aromatic Acids Produced During Degradation of Lignin in Spruce Wood by *Phanerochaete chrysosporium*, *Holzforschung* 36 (1): 3-9.
33. Chua, M. G. S., C-L. Chen, H-m. Chang, and T. K. Kirk, 1982, ¹³C NMR Spectroscopic Study of Lignin Degraded by *Phanerochaete chrysosporium* I. New Structures, *Holzforschung* 36 (4): 165-172.
34. Chua, M. G. S., C-L. Chen, J. Evans, and H-m. Chang, 1982. ¹³C NMR Spectroscopic Study of Lignin Degraded by *Phanerochaete chrysosporium* II. Synthesis and Chemical Shifts of Model Compounds, *Holzforschung* 36 (5): 239-247.
35. Eaton, D. C., H-m. Chang, T.W. Joyce, T. W. Jeffries, and T. K. Kirk, 1982, Method Obtains Fungal Reduction of the Color of Extraction-stage Kraft Bleach Effluents: The FPL/NCSU MyCoR Method, *Tappi* 65 (6): 89-92.
36. Eaton, D. C., H-m. Chang, T. K. Kirk, 1982, Kraft Bleach Plant Effluent Can Be Decolorized Using the Synergistic Effects of Cations Solubilized by Acidification of Waste Sludge, *Tappi* 65 (5): 167-170.

37. Bar-Lev, S. S., T. K. Kirk, and H-m. Chang, 1982, Evidence that Fungal Treatment Can Reduce the Energy Requirement for Secondary Refining of Thermal Mechanical Pulp, *Tappi* 65 (10): 11-113.
38. Chen, C-L., H-m. Chang and T. K. Kirk, 1983, Carboxylic Acids Produced Through Oxidative Cleavage of Aromatic Rings during Degradation of Lignin in Spruce Wood by Phanerochaete chrysosporium, *J. Wood Chem. and Techn.* 3 (1), 35-37.
39. Joyce, T. W. E. D. Gerrard, A. G. Campbell, H-m. Chang and T. K. Kirk, 1984, Toward the Development of a Biological Process for Removal of Color from Pulp and Paper Mill Effluents. *AIChE Symposium* 80 (239): 86-89.
40. Joyce, T. W. H-m. Chang, A. G. Campbell, E. D. Gerrard and T. K. Kirk, 1984, A Continuous Biological Process to Decolorize Bleach Plant Effluents, *Biotech Adv* 2:301-308
41. Kirkman, A. G., E. K. Andrews and H-m. Chang, 1984, Impact of Extended Delignification Using Green Liquor Pretreatments on Kraft Mill Chemical and Energy Balances, *AIChE Symposium* 80 (232): 66-73.
42. Pan, G. Y., C-L. Chen, H-m. Chang and J. S. Gratzl, 1984, Studies on Ozone Bleaching I., The Effect of pH, Temperature, Buffer System and Heavy Metal-Ions on Stability of Ozone In Aqueous Solution, *J. of Wood Chem. & Technol.* 4 (3): 367-387.
43. Huynh, V-B., H-m. Chang, T. W. Joyce and T. K. Kirk, 1985, Dechlorination of Chloroorganics by a White-Rot Fungus, *Tappi* 68 (7): 98-102.
44. Andrews, E. K., H-m. Chang, and R. C. Eckert, 1985, Extending Delignification in Kraft-Oxygen Pulping of Softwood by Treatment with Sodium Sulfide Liquors, *J. Wood Chem. & Technol.* 5 (4): 431-450.
45. Jiang, J.-E., H-m. Chang, S.S. Bhattacharjee and D.L.W. Kwoh, 1987. Characterization of Residual Lignins Isolated from Unbleached and Semibleached Softwood Kraft Pulps, *J. Wood Chem. and Technol.* 7 (1): 81-96.
46. Taneda, H., J. Nakano, S. Hosoya, and H-m. Chang, 1987, The Stability of β -Ether Type LCC Model Compounds in Chemical Pulping Processes. *J. Wood Chem. & Technol.* 7 (4): 485-497.
47. Pellinen, J., T. W. Joyce, and H-m. Chang, 1988, Dechlorination of High-Molecular-Weight Chlorolignin by the white-rot fungus *P. chrysosporium*, *Tappi* 71 (9): 191-194.
48. Pellinen, J., C-F. Yin, T. W. Joyce and H-m. Chang, 1988, Treatment of Chlorine Bleaching Effluent Using a White-Rot Fungus, *J. Biotechn.* 8: 67-76.
49. Hong, Q., N. H. Shin, and H-m. Chang, 1989, Effects of Oxygen Extraction on Organic Chlorine Content of Bleach Plant Effluents, *Tappi* 72 (6): 157-162.
50. Sun, Y-b., T. W. Joyce and H-m. Chang, 1989, Dechlorination and Decolorization of High-Molecular-Weight Chlorolignin from Bleach Plant Effluents by an Oxidation Process, *Tappi* 72 (9): 209-213.
51. Yin, C-F., T. W. Joyce, and H-m. Chang, 1989. Kinetics of Bleach Plant Effluent Decolorization by *Phanerochaete chrysosporium*, *J. Biotechnology* 10:67-76.

52. Yin, C-F, T. W. Joyce and H-m. Chang, 1989. Role of Glucose in Fungal Decolorization of Wood Pulp Bleaching Effluents, *J. Biotechnology* 10:77-84.
53. Pellinen, J., J. Abuhasan, T. W. Joyce and H-m. Chang, 1989. Biological Delignification of Pulp by *Phanerochaete chrysosporium*, *J. Biotechnology* 10:161-170.
54. Tai, D-s, M. Terazawa, C-L. Chen and H-m. Chang, 1990. Lignin Biodegradation Products from Birch Wood by *Phanerochaete chrysosporium*, Part 1, Fractionation of Methanol extractive and characterization of Ether-insoluble Low-molecular-weight Fraction, *Holzforschung* 44 (3): 185-190.
55. Tai, D-s., M. Terazawa, C-L. Chen, and H-m. Chang, 1990, Lignin Biodegradation Products from Birch Wood Decayed by *Phanerochaete chrysosporium*, Part 2, The Constituents of Ether-soluble Low-molecular-weight Fractions, *Holzforschung* 44 (4): 257-262.
56. Sun, Y-b., H-m. Chang, T. W. Joyce, H. Jameel and V. S. Sundaram, 1990, Chlorate Interference in the Schoniger TOCI Test, *Tappi* 73 (10): 251-254.
57. Seger, G. E., H-m. Chang and H. Jameel, 1991, Chlorine Dioxide Reactions with Nonphenolic Lignin Model Compounds, *Tappi* 74 (12): 195.
58. Sezgi, U. S., J. M. Abuhasan, H. Jameel and H-m. Chang, 1992, Effect of Anthraquinone on RDH Pulping, *Appita J.* 45(5): 173-177.
59. Seager, G. E., H. Jameel and H-m. Chang, 1992, Bleaching of Low Kappa Pulps with High/Low pH Chlorine Dioxide Bleaching, *Appita J.* 45(1): 113-118.
60. Seger, G. E., H. Jameel and H-m. Chang, 1992, High/Low pH Chlorine Dioxide Bleaching for Improved Efficiency, *Tappi* 75(7): 174-180.
61. Sun, Y-b., H-y. Guo, T. W. Joyce, and H-m. Chang, 1992, A Study on the Reduction of chlorinated Organics in Bleaching Plant Effluent by Oxidation with Oxygen, *J. Pulp and Paper Sci.* 18(3): J49-55.
62. Fukui, H., T. L. Presnell, T. W. Joyce and H-m. Chang, 1992, Decolorization and detoxification of Bleach Plant Effluent by *Phanerochaete chrysosporium*, *J. Biotechnology* 24(1992): 267-275.
63. Presnell, T. L., H. Fukui, T. W. Joyce and H-m. Chang, 1992, Bleach Plant Effluent Influences Enzyme Production by *Phanerochaete chrysosporium*, *Enzyme Micro. Technol.* 14(3): 184-189.
64. Fukui, H., M. J. Abuhasan, H-m. Chang and T. W. Joyce, 1992, Improved Conditions for Bidelignification of Deinked Pulp by Enzymes from *Phanerochaete chrysosporium*, *Cellulose Chem. and Technol.* 26(6): 701-711.
65. Presnell, T. L., H. E. Swaisgood, T. W. Joyce and H-m. Chang, 1994, Investigation into the kinetic properties of immobilized Lignin Peroxidases, *J. Biotechnology* 35:77-85.
66. Sezgi, U. S., A. G. Kirkman, H. Jameel, H-m. Chang, J. J. Morrison, C. A. Bianchini and J. Wilson, 1994, A Combined Discrete-Continuous Simulation of RDH Tank Farm, *Tappi* 77(7): 213
67. Sreeram, C., V. Sundaram, H. Jameel and H-m. Chang, 1994, Laboratory-Scale Medium Consistency Ozone Bleaching System, *Tappi* 77(10):161

68. Chang, H-m., T. K. Kirk and A. M. Stomp, 1994, Biotechnology in Pulp and Paper Manufacture I, *China Pulp and Paper* 13 (4):51-56.
69. Chang, H-m., T. K. Kirk and A. M. Stomp, 1994, Biotechnology in Pulp and Paper Manufacture II, *China Pulp and Paper* 13 (5):54-59.
70. Chen, Zu-Xin, J. A. Heitmann, and H-m. Chang, 1995, Recycled Fiber Quality Improvement, *Taiwan Tappi* 1 (1): 35-42.
71. Pan, G. Y., C. -L. Chen, J. S. Gratzl and H-m. Chang, 1995, Model Compound Studies on the Cleavage of Glycosidic Bonds by Ozone in Aqueous Solution, *Res. Chem. Intermed.*, 21(3-5):205-222.
72. Kadla, J. K., H. Jameel and H-m. Chang, 1997, The Reactions of Lignins with High Temperature Hydrogen Peroxide. Part I. The Oxidation of Lignin Model Compounds, *Holzforschung* 51:428
73. Kadla, J. K., H-m. Chang, C-L. Chen and J. S. Gratzl, 1998, Reactions of Lignin with Cyanamide Activated Hydrogen Peroxide. Part I. The Degradation of Lignin Model Compounds, *Holzforschung* 52:506-512.
74. Kadla, J. K., H-m. Chang, C-L. Chen and J. S. Gratzl, 1998, Reactions of Lignin with Cyanamide Activated Hydrogen Peroxide. Part II. The Degradation Mechanism of Phenolic Lignin Model Compounds, *Holzforschung* 52:513-520.

75. H-m. Chang, 1999, Economic Outlook for Asia's Pulp and Paper Industry, *Tappi* 82(1): 50-52.
76. J. K. Kadla, H. Jameel and H-m. Chang, 1999, The Reactions of Lignins with High Temperature Hydrogen Peroxide. Part II. The Oxidation of Kraft Lignin, *Holzforschung* 53:277-284
77. R. A. Venditti, H. M. Chang, H. Jameel, 1999, Overview of Stickies Research at North Carolina State University, *PaperAge*, 115(11), pp. 18-20,
78. X. Huo, R. A. Venditti and H-m. Chang, 2001, Use of Deposition and Extraction Techniques to Track Adhesive Contaminants (Stickies) in a Papermill, *Progress in Paper Recycling* 10(2):15-23
79. X. Huo, R. A. Venditti and H-m. Chang, 2001, Effect of Cationic Polymers, Salts and Fibers on the Stability of Model Micro-Stickies, *J. of Pulp and Paper Science* 27(6): 207- 212
80. D. Svenson, J. F. Kadla, H. Jameel, H-m Chang, 2002, Effect of pH on the Mechanism of OClO oxidation of Aromatic Compounds" *Can. J. Chem.* 80(7): 761-766
81. D. Svenson, J. F. Kadla, H. Jameel, H-m Chang, 2002, The Reactions of Chlorine Dioxide with a Non-Phenolic Lignin Model Compound. Part I. Organic and Inorganic Reactions" *Ind. Eng Chem. Res.* 41:5927-5933
82. T. Yokoyama, J. F. Kadla, H-m Chang, H. Jameel, 2002, Microanalytical Method for the Characterization of Fiber Components and Morphology of Woody Plants, *J. Agr. Food Chem.* 50:1040-1044
83. T. Ikeda, J. F. Kadla, H-m Chang, H. Jameel, 2002, Studies on the Effect of Ball Milling on Lignin Structure using a Modified DFRC Method, *J Agr. Food. Chem.* 50:129-135

84. J.F. Kadla, H-m. Chang, **2002**, Reactions of lignin with cyanamide activated hydrogen peroxide. Part 3. The degradation of kraft lignin.” *Holzforchung* 56, 76-84,
85. R. A. Venditti, H. M. Chang, K. Copeland, **2002**, Evaluation of Various Adhesive Contaminant (Stickies) Analysis Methods for the Use in Old Corrugated Container Recycling Plants, *Progress in Paper Recycling*, **11(2)**:38-46
86. T. Zhu, J.F. Kadla, H-m. Chang, **2003**, A Novel Method for the Synthesis of Peroxymonophosphoric acid, *Can J Chem.* 81:156-160.
87. T. Zhu, J.F. Kadla, H-m. Chang, H. Jameel, **2003**, Reactions of Lignin with Peroxymonophosphoric Acid: The Degradation of Lignin Model Compounds” *Holzforchung* 57:41-51
88. T. Kishimoto, J. F. Kadla, H-m Chang, H. Jameel, **2003** The Reactions of Hydrogen Peroxide in Caro’s Acid Bleaching at Low pH, *Holzforchung* 57:52-58
89. K. M. Holtman, H.-m. Chang H. Jameel, J. F. Kadla, **2003**, Elucidation of Lignin Structure Through Degradative Methods: Comparison of Modified DFRC And Thioacidolysis, *J. Agr Food Chem.* 51(12); 3535-3540
90. R. Sykes, F. Isik, B. Li, J. F. Kadla, H-m. Chang, **2003**, “Genetic Variation of Physio-chemical Wood Properties in Loblolly Pine (*Pinus taeda* L.), *Tappi J.* 2(12):3-8
91. M. R. Doshi, A. Blanco, C. Negro, T. Delagoutte, G. M. Dorris, C. C. Castro, A. Hamann, R. D. Haynes, C. Houtman, K. Scallon, J. J. Putz, H. Johansson, R. A. Venditti, K. Copeland, H. M. Chang, **2003**, Comparison of Micro Stickies Measurement Methods Part I: Sample Preparation and Measurement Methods, *Progress in Paper Recycling*, **12(4)**: 35-42
92. M. R. Doshi, A. Blanco, C. Negro, T. Delagoutte, G. M. Dorris, C. C. Castro, A. Hamann, R. D. Haynes, C. Houtman, K. Scallon, J. J. Putz, H. Johansson, R. A. Venditti, K. Copeland, H. M. Chang, **2004**, Comparison of Micro Stickies Measurement Methods Part II: Results and Discussion, *Progress in Paper Recycling*, **13(1)**: 44-53,
93. T. Yokoyama, H-m. Chang, R. S. Reiner, R. H. Atalla, I. A. Weinstock, J. F. Kadla, **2004**, “Polyoxometalate oxidation of lignin subunits in water: Effect of substrate structure on reaction mechanism” *Holzforchung* 58:116-121
94. C. Morris, J.T. Scott, R. Sederoff, D. O’Malley, H-m. Chang, J. F. Kadla, **2004**, Metabolic Profiling, a New Tool for analyzing Wood Formation, *J. Agr Food Chem.* 52(6): 1427-1434
95. T.Yeh, H-m. Chang, J.F. Kadla, **2004**, Rapid Prediction of Solid Wood Lignin Content Using Transmittance Near Infrared Spectroscopy, *J. Agr Food Chem.* 52(6): 1435-1439
96. K. M. Holtman, H.-m. Chang, J. F. Kadla, **2004**, Solution-State Nuclear Magnetic Resonance Study of the Similarities between Milled Wood Lignin and Cellulolytic Enzyme Lignin, *J. Agr Food Chem.* 52(4): 720-726
97. Q. Dai, H. Jameel, H-m. Chang and J. F. Kadla, **2004**, Bleachability of Kraft Pulps from Earlywood and Latewood of Fast-Growing Loblolly Pine, *J. Wood Chem. & Technology* **24(4)**: 357-370
98. S. Lemune, H. Jameel, H-m Chang J.F. Kadla, **2004**, Effects of ozone and chlorine dioxide on the chemical and physical properties of cellulose fibers” *J. Appl Polym Sci.* **93**: 1219-1223

99. J. Chen, J. A. Heitmann, H-m. Chang, M. A. Hubbe and R. A. Venditti, **2004**, The effect of Paper Additives on Xerographic Toner Agglomeration during the Recycling Process, *Progress in Paper Recycling*, **13(4)**: 16-23
100. D. R. Svenson, H. Jameel, H-m Chang, J.F. Kadla, **2005**, "The role of non-phenolic lignin in chlorate forming reactions during ClO₂ bleaching of softwood kraft pulp" *Holzforchung* **59**: 110-115
101. A. Fujimoto, Y. Matsumoto, H-m. Chang and G. Meshitsuka, **2005**, Quantitative Evaluation of Milling Effects on Lignin Structure during the Isolation Process of Milled Wood Lignin, *J. Wood Science* **51(1)**: 89-91
102. T. Yeh, T. Yamada, E. Capanema, H-m. Chang, V. Chiang and J. F. Kadla, **2005**, Rapid Screening of Wood Chemical Composition Variations Using Transmittance Near-Infrared Spectroscopy, *J. Agr Food Chem.* **53(9)**: 3328-3332
103. T. Yeh, B. Goldfarb, H-m. Chang, I Peszlen, J. L. Braun and J. F. Kadla, **2005**, Comparison of Morphological and Chemical Properties between Juvenile Wood and Compression Wood of Loblolly Pine, *Holzforchung* **59(6)**: 669-674
104. R. Sykes, B. Li, G. Hodge, B. Goldfarb, J. F. Kadla, and H.-m. Chang, **2005**, Prediction of loblolly pine wood properties using transmittance near-infrared spectroscopy, *Can. J. For. Res.* **35**: 2423-2431
105. T. Yamada, T. Yeh, H-m. Chang, L. Li, J. F. Kadla, and V. L. Chiang, **2006**, Rapid Analysis of Transgenic Trees Using Transmittance Near-Infrared Spectroscopy (NIR), *Holzforchung* **60(1)**: 24-28
106. T. Yeh, J. Braun, B. Goldfarb, H-m. Chang and J. F. Kadla, **2006**, Morphological and Chemical Variations between Juvenile Wood, Mature Wood and Compression Wood of Loblolly Pine (*Pinus taeda* L.), *Holzforchung* **60(1)**: 1-8
107. Z. Hu, T. Yeh, H-m. Chang, Yuji Matsumoto and J. F. Kadla, **2006**, Elucidation of the Structure of Cellulolytic Enzyme Lignin, *Holzforchung* **60**: 389-397
108. T. Yeh, C. R. Morris, B. Goldfarb, H-m. Chang and J. F. Kadla, **2006**, Utilization of Polar Metabolite Profiling in the Comparison of Juvenile Wood and Compression Wood in Loblolly Pine (*Pinus taeda*). *Tree Physiology* **26**: 1497-1503
109. K. M. Holtman, H-m. Chang, H. Jameel and J. F. Kadla, **2006**, Quantitative ¹³C NMR Characterization of Milled Wood Lignin Isolated by Different Milling Techniques. *J. Wood Chem. & Technology* **26**: 21-34
110. Q. Dai, H. Jameel and H-m. Chang, **2006**, Precipitation of Extractives onto Kraft Pulp during Black Liquor Recycling in Extended Delignification Process. *J. Wood Chem. & Technology* **26**: 35-51
111. I-C. Wang, H-m. Chang, Y-C. Su, C-L. Ho and Y-S. Perng, **2006**, Disposal of Solid Wastes from the Paper Industry Using a CHTC-based Technology: a Preliminary Study. *Taiwan J. For. Sci.* **21(1)**: 1-9
112. I-C. Wang, Y-S. Perng, Y-C. Su, C-L. Ho and H-m. Chang, **2006**, Disposal of Solid Wastes from the Paper Industry Using a CHTC-based Technology: Optimization of the Treatment Conditions. *Taiwan J. For. Sci.* **21(1)**: 11-22

113. M. Yu. Balakshin, E. A. Capadema and H-m. Chang, **2007**, MWL fraction with a high concentration of lignin-carbohydrate linkages: Isolation and 2D NMR spectroscopic analysis, *Holzforschung* **61**: 1-7
114. M. Mazur, K. Hope-Ross, J. F. Kadla, R. Sederoff and H-m. Chang, **2007**, Synthesis of Hydroxyphenylpropanoid β -D-glucosides, *J. Wood Chem. & Technology* **27**(1): 1-8
115. Yong Sik Kim, Hou-min Chang and John F. Kadla, **2007**, Polyoxometalate (POM) Oxidation of Milled Wood Lignin (MWL), *J. Wood Chem. & Technology* **27**(3 & 4): 225-241
116. Q-m. Chen, Z. Hu, H-m. Chang and B. Li, **2007**, Micro Analytical Methods for Determination of Compression Wood Content in Loblolly Pine, *J. Wood Chem. & Technology* **27**(3 & 4): 169-178
117. K. M. Holtman, H-M. Chang and J. F. Kadla, **2007**, An NMR Comparison of the Whole Lignin from Milled Wood, MWL, and REL Dissolved by the DMSO/NMI Procedure, *J. Wood Chem. & Technology* **27**(3 & 4): 179-200
118. Y.S. Kim, H.-M. Chang, and J.F. Kadla, **2008**, Polyoxometalate (POM) oxidation of phenolic compounds: Effect of aromatic substituent groups on reaction mechanism. *J. of Wood Chem. and Technology*, **28**(1): 1-25, Y.S. Kim, H.-M. Chang, and J.F. Kadla. **2008**, *Polyoxometalate (POM) oxidation of lignin model compounds. Holzforschung*, 62: 38-49,
119. Z. Wang, T. Yokoyama, H-m. Chang and Y. Matsumoto, **2009**, Dissolution of Beech and Spruce Milled Woods in LiCl/DMSO, *J. Agr Food Chem.* 57(14): 6167-6170
120. C. Chi, Z. Zhang, H-m. Chang and Hasan Jameel, **2009**, Determination of Furfural and Hydroxymethylfurfural Formed from Biomass Under acidic conditions, *J. of Wood Chem. & Technol.***29**(4): 265-276

