Xiao Zhang, PhD

Major Awards, Honours, Editorialship

Member of International Editorial Board, 2006 – Present
BioResources Journal (http://www.ncsu.edu/bioresources/editorialboard.htm).

International Reviewer
South Africa's National Research Foundation (NRF), **South Africa**
Superior Council of the National Fund for Scientific & Technological Development (Chilean government research funding agency), **Chile**

C. Howard Smith Award, 2000
For the best paper by a young member of Pulp and Paper Technical Association of Canada. The award consists of a gold pin, a certificate and a travel allowance of $2,000 CND.

BC Science Council GREAT Award, 1999-2001
Based on the excellence of both student and the project. The scholarship is valued at $20,000 CND per annum.

Best Paper Open Category, Parksville Mini-Conference, 1998
16 entrées entered the conference hosted by PAPTAC Pacific Coast Branch.

Peer Reviewer
Grant Applications: Natural Science and Engineering Council of Canada
Journal publications: Biotechnology and Bioengineering, Analytical Biochemistry, Industrial & Engineering Chemistry Research; Journal of Agricultural and Food Chemistry; Journal of Industrial Microbiology & Biotechnology, *etc*.

Professional Experience

Assistant Professor, Washington State University, USA ***2009- present***

Bioproducts and bioenergy development

Scientist/Senior Scientist, Biotechnology group, FPInnovations Paprican Division ***2003 – 2009***
(Pulp and Paper Research Institute of Canada)

- ***Research:***
  - Forest Biorefinery
  - Biotechnology applications in pulp and papermaking

- ***PDF and Graduate students:***
  - Supervisor: Dr. Maobing TU, NSERC Postdoctoral Fellowships
  - Co-supervisor: David Nguyen, Concordia University. (Graduated in December. 2006)
  - Co-supervisor: Vineet Dua, Concordia University
  - Industrial supervisor (NSERC IPS): Wenjuan Qing, University of British Columbia.

Xiao Zhang, PhD

Post-Doctoral/Research Associate, Wood Science, UBC, Vancouver, BC ***2001 – 2003***

Lecturer, Chemical Engineering College, NFU, China ***1995 – 1996***

Research Assistant, Chemical Engineering College, NFU, China ***1988 – 1992***

Academic Degrees

Ph.D. Forest Products Biotechnology, University of British Columbia, Vancouver, BC (2001)

M. Eng. Chemical Engineering, Nanjing Forest University, China (1995)

Recent Publications

INVITED PAPER

Mike Paice and **Xiao Zhang,** "Enzyme Find Their Niche", *Pulp and Paper Canada,* 106(6):17-20 (2005)

ARTICLES IN PEER-REVIEWED JOURNALS

Tu, M., **Zhang, X.,** Paice M. and Saddler J.N. "The potential of enzyme recycling during the hydrolysis of a mixed softwood feedstock" 100(24):6407–6415, ***Bioresource Technology*** (2009).

Zhang, X., Qin, W. Paice M. and Saddler, J.N., "High consistency hydrolysis of pretreated hardwood substrate" 100(23):5890-5897, ***Bioresource Technology*** (2009)

Sitholé, B., Shirin, S., **Zhang, X.,** Lapierre, L., Pimentel, J., and Paice M. "Deresination options in sulphite pulping" *Accepted*, ***Bioresources*** (2009)

Tu, M., **Zhang, X.,** Paice M. and Saddler J.N. "Effect of Surfactants on SHF and SSF of Steam Exploded Lodgepole Pine with Inhibitors" 25(4):1122 - 1129***, Biotechnology Progress*** (2008)

Zhang, X., Renaud, S. and Paice, M.G., "Cellulase Deinking of Fresh and Aged ONP", ***Enzyme and Microbial Technology*** 43:103-108 (2008)

Nguyen, D., **Zhang**, **X.,** Jiang Z.H., Audet A. and Renaud S., "Bleaching of Kraft Pulp by a Commercial Lipase: Accessory enzymes degrade hexenuronic acids", ***Enzyme and Microbial Technology,*** 43:130-136 (2008)

Nguyen, D., **Zhang**, **X.,** Paice, M., Tsang, A. and Renaud, S., "Microplate-based Assay for Screening Lipoxygenase to Degrade Wood Extractives", ***Biocatalysis and Biotransformation*** 25:202-210 (2007)

Xiao Zhang, PhD

Zhang, **X.,** Nguyen, D., Paice, M., Tsang, A. and Renaud, S., "Degradation of Wood extractives on Thermo-mechanical Pulp by Soybean Lipoxygenase", ***Enzyme and Microbial Technology*** 40:866-873 (2007)

Tu, M., **Zhang**, **X.,** Kurabi, A., Gilkes, N., Mabee, W. and Saddler, J.N., "Immobilization of β-glucosidase on Eupergit C for Lignocellulose Hydrolysis", ***Biotechnology Letters***, 28(3):151-156 (2006)

Zhang, X., Renaud, S. and Paice, M.G., "The Potential of Laccase to Remove Extractives Present in Pulp and Whitewater from TMP Newsprint Mills", ***Journal of Pulp and Paper Science*** 31(4):175-180 (2005)

Pan, X., Arato, C., Gilkes, N., Gregg, D.J., Mabee, W.E., Pye, K., Xiao, Z., **Zhang, X.** and Saddler, J.N. "Biorefining of Softwoods Using Ethanol Organosolv Pulping - Preliminary Evaluation of Process Streams for Manufacture of Fuel Grade Ethanol and Co-products", ***Biotechnology & Bioengineering***, 90(4):473-481. (2005)

Pan, X., **Zhang, X**., Gregg, D.J. and Saddler, J.N. "Enhanced Enzymatic Hydrolysis of Steam-Exploded Douglas-Fir Wood by Alkali-Oxygen Post-treatment", ***Applied Biochemistry and Biotechnology***, 115(1-3): 1103-1114 (2004)

Xiao, Z., **Zhang, X**., Gregg, D. and Saddler, J.N. "The Effects of Sugar Inhibition on Cellulases and β-glucosidase during the Enzymatic Hydrolysis of Softwood Substrates", ***Applied Biochemistry and Biotechnology***, 115(1-3)1115-1126 (2004)

Stebbing, D.W., **Zhang, X.,** Soong, G., Mansfield, S.D. and Saddler, J.N. "Fungal Enzyme Treatment of Newsprint Mill White Water – Impact on White Water and Paper Properties", ***Journal of Pulp and Paper Science,*** 30(1)3-8 (2004)

Zhang, X., Eigendorf, G., Stebbing, D., Mansfield, S.D. and Saddler, J. N., "Degradation of Trilinolein by Fungal Laccases", ***Archives of Biochemistry and Biophysics***, 405(1)44-54 (2002)

Zhang, X., Stebbing, D., J.J. Soong, Saddler, J. N. and Beatson, R.P., "The Potential of a Combined Fungal and Enzyme Treatment System for the Removal of Detrimental Dissolved and Colloidal Substances from TMP/newsprint Mill White Waters", ***Tappi J.,*** 85(5)26-32 (2002)

Zhang, X., Stebbing, D., Saddler, J. N. and Beatson, R.P., "Enzyme Treatments of the Dissolved and Colloidal Substances Present in Mill White Water and the Effects on the Resulting Paper Properties", ***J. Wood Chemistry and Technology***, 20(3):321-318 (2000)

Zhang, X., "The Effects of White Water Dissolved and Colloidal Fractions on Paper Properties and Effects of Various Enzyme Treatments on the Removal of Organic Components", ***Pulp and Paper Canada***, 101(3): 59-62 (2000) (*Winning Paper for 1999 C. Howard Smith Award from the Pulp and Paper Technical Association of Canada*)

Zhang, X., Beatson, R.P., Cai, Y.J. and Saddler, J. N., "Accumulation of Specific Dissolved and Colloidal Substances During White Water Recycling Affects Paper Properties", ***Journal of Pulp and Paper Science***,

25(6): 206-210 (1999)

Qu, Y., Gao, P., Wang, D., Zhao, X. and **Zhang, X.,** "Production, Characterization and Application of the Cellulase-free Xylanase from *Aspergillus niger*", ***Applied Biochemistry and Biotechnology.*** 57/58:375-381 (1996)

Zhang, X., Zhang, D.T. and Lee, Z.Z., "The Role of Hemicellulases E-An-76 in Birch (*Betula*) Kraft Pulp Bleaching Process", ***China Pulp and Paper***, Vol.15(5):38-43 (1996)

Zhang, X., Zhang, D.T. and Lee, Z.Z., "Biobleaching of Birch (*Betula*) Kraft Pulp and Wheat-straw Soda-AQ Pulp with E-An-76 (hemicellulase)", ***Chem. Ind. For. Prod***., Vol.15(4):39-44 (1995)

PATENTS

Xiao Zhang and Zhi-Hua Jiang "CONVERSION OF KNOT REJECTS FROM CHEMICAL PULPING" WO/2009/076760.

PAPRICAN INTERNAL PUBLICATIONS

Xiao Zhang, Maobing Tu, Mike Paice, George Sacciadis, Zhihua Jiang, Naceur Jemaa "Bioconversion of knot rejects from a chemical pulp mill to biofuel and bioproducts" **Paprican Research Report** 2008

Tom Browne, Naceur Jemaa, Ibrahim Karidio, Talat Mahmood, Mike Paice, Mike Paleologou and **Xiao Zhang**, "The Forest Biorefinery: Current State of the Art" ***Paprican Special Report*** 2008

Theodore Radiotis, **Xiao Zhang**, Michael Paice, "Pre-Extraction of Hemicelluloses from Softwood prior to Kraft Pulping" ***Paprican Special Report*** 2008

Maobing Tu, Xiao Zhang, Mike Paice Paul, McFarlane, Jack Saddler, "Effect of Surfactants on Separate Hydrolysis Fermentation and Simultaneous Saccharification Fermentation of Pretreated Lodgepole Pine", ***Paprican Special Report*** **607**, August 2008.

Xiao Zhang, Sylvie Renaud, Mike Paice **"**A rapid, simple assay to determine the lipophilic extractives content in wood chips and white water" ***Paprican Research Report*** **1877,** April 2008

Bruce Sitholé, Salma Shirin, **Xiao Zhang,** Luc Lapierre, Jorge Pimentel, Michael G Paice, "Deresination Options in Sulphite Pulping" ***Paprican Research Report 1831,*** January 2007

Xiao Zhang, David Nguyen, Zhi-Hua Jiang, André Audet, Michael G. Paice, Sylvie Renaud and Adrian Tsang, "Bleaching of Kraft Pulp by a Commercial Lipase: Accessory enzymes degrade hexenuronic acids" ***Paprican Research Report 1819***, October 2006

Xiao Zhang, Sylvie Renaud, and Michael Paice "Cellulase Deinking of Fresh and Aged ONP" ***Paprican Research Report 1791,*** March 2006

David Nguyen, **Xiao Zhang,** Mike Paice, Adrian Tsang, and Sylvie Renaud "The Development of a Microplate Enzyme Assay for Screening Lipoxygenase to Degrade Wood Extractives" ***Paprican University***

Report 891, February 2006

Xiao Zhang, David Nguyen, Mike Paice, Adrian Tsang and Sylvie Renaud "Degradation of wood extractives in thermo-mechanical pulp by soybean lipoxygenase" ***Paprican Research Report 1775,*** October 2005

Xiao Zhang, Sylvie Renaud, and Michael Paice, "The Potential of Laccase to Remove Extractives Present in Mechanical Pulp and White Water from TMP/newsprint mills" ***Paprican Research Report 1743,*** November 2004

Xiao Zhang and Mike Paice, "Review of the Potential Commercial Opportunity for Ethanol Production from Softwood Biomass" Consulting report prepared for Catalyst Paper, Crofton, BC: March 2005.

RESEARCH PAPERS INCLUDED IN CONFERENCE PROCEEDINGS

Zhang, X., Nguyen, D., Paice, M., Tsang, A., Renaud, S. (2006). *Application of Lipoxygenase to Degrade Wood Extractives in Thermomechanical Pulp*. ***Proceedings*** of the 60th Annual Pacific Coast Branch Pulp and Paper Technical Association of Canada Conference. Parksville, British Columbia, April 21-22, 2006.

Zhang, X., Soong, G. and Beatson, R.P., " Natural variation in the morphological and chemical characteristics of the stems of *Arabidopsis* ecotypes", *13th International Conference on Arabidopsis Research*, Seville, Spain June 28th 2002

Zhang, X., Stebbing, D., Beatson, R.P., Saddler, J. N., Chalmers, B.G. and Ling, J., "The removal of detrimental dissolved and colloidal substances by a combined fungal and enzyme treatment", *86 PAPTAC Annual Meeting*, Montreal, QC Canada, Jan. 31 – Feb. 3rd, 2000. Vol. B:99.

Beatson, R.P., **Zhang, X.,** Stebbing, D. and Saddler, J. N., "The dissolved and colloidal fractions of white water: impact on paper properties and degradation by enzymes", *10th International Symposium on Wood and Pulp Chemistry*, Yokohama, Japan, June 7-10, 1999. Vol. I:200-203.

Zhang, X., Beatson, R.P., Chalmers, B.G., Francis, D.W. and Saddler, J. N., "Paper quality problems caused by the different organic components of newsprint white water. Can they be solved by enzymes?" In *Proceedings of the 1999 Sustainable Forest Management Network Conference* p680, Edmonton Albert, February 14-17, 1999.

Zhang, X., Beatson, R.P., Stebbing, D. and Saddler, J. N., " The different effects of white water dissolved and colloidal fractions on the paper properties", In *Proceedings of the 1999 Sustainable Forest Management Network Conference* p811, Edmonton Albert, February 14-17, 1999.

Zhang, X., Cai, Y.J., Stebbing, D., Beatson, R.P., and Saddler, J. N., "Influence of accumulated dissolved and colloidal substances on paper properties and the potential of enzyme treatment for component removal", *7th International Conference on Biotechnology in the Pulp and Paper Industry*, Vancouver, BC Canada, June 16-19, 1998, Vol. C:151-154.

Cai, Y.J., **Zhang, X.,** de Jong, E., Beatson, R.P., and Saddler, J. N., "Fungal treatment of organic

contaminants present in the white water of a thermomechanical pulp mill", *7th International Conference on Biotechnology in the Pulp and Paper Industry*, Vancouver, BC Canada, June 16-19, 1998, Vol. C:155-158.

Quan, J., Gan, X., Huang, J., Wang, P., **Zhang, X.,** "The biological structure and chemical composition of bamboos for pulping", *2nd International Nonwood Fiber Pulping and Papermaking Conference*, 6-9 April 1992, Shanghai, China, vol. II, pp 639-649, TAPPI Press Atlanta, GA, USA.

Conference Organizations and Presentations

SESSION MODERATOR

5th Annual World Congress on Industrial Biotechnology & Bioprocessing, Session title: Linking the Pulp and Paper Industry with Lignocellulose Bioconversion**,** Chicago, Illinois, April 27-30, 2008

ORAL PRESENTATIONS AND LECTURES

95th PAPTAC Annual Meeting, High Consistency Hydrolysis of Hardwood Substrates, Montreal QC, Feb 2-4th, 2009

30th Symposium on Biotechnology for Fuels and Chemicals, Effect of Surfactants on Separate Hydrolysis Fermentation and Simultaneous Saccharification Fermentation of pretreated Lodgepole Pine, (presented by Dr. Maobing Tu, Postdoctoral fellow), New Orleans, LA May 4 - 7, 2008

"Biotechnology Pathways to the Forest Biorefinery", (**Invited lecture**), Nanjing Forestry University, China, May 22nd, 2007

10th International Congress on Biotechnology in the Pulp and Paper Industry, Bleaching of Kraft Pulp by a Commercial Lipase (**Plenary lecture**) , Madison, Wisconsin, June 10-14, 2007.

7th International Exhibition-Congress on Chemical Engineering and Biotechnology, "Biotechnology applications in pulp and paper industry", Beijing, China, May 14-18, 2007

60th Annual Pacific Coast Branch Pulp and Paper Technical Association of Canada Conference, Application of Lipoxygenase to Degrade Wood Extractives in Thermomechanical Pulp (presented by David Nguyen, Graduate student), Parksville, British Columbia, April 21-22, 2006

1st International Symposium on Environmental Biocatalysis: "Degradation of wood extractives in thermo-mechanical pulp by oxidative enzymes", Cordoba, Spain, April 23-26, 2006.

PACWEST Conference: "Potential of laccase to remove extractives from TMP/newsprint mills", Harrison Hot Springs, BC, May 11-14, 2005.

"New opportunities for enzyme applications in pulp and paper manufacturing", (**Invited lecture**) Fungal Genomic Research Day, Department of Biology, Concordia University, March 2005.

25th Symposium on Biotechnology for Fuels and Chemicals: "Can we produce an "ideal" substrate from softwood for enzymatic hydrolysis?" Breckenridge, Colorado, May 4-7, 2003.

***8th International Conference on Biotechnology in the Pulp and Paper Industry*:** "Laccase catalyzed modification of lipophilic extractives found in TMP/newsprint mill process waters", Helsinki, Finland, June 4-6, 2001.

PACWEST Conference: "Fungal and enzyme treatment kidney: a promising way to help pulp and paper mills to achieve zero effluent discharge", Whistler BC, May 16-19, 2001.

***2000 International Environmental Conference*:** "The Potential of a combined fungal and enzyme treatment system for the removal of detrimental dissolved and colloidal substances from TMP/newsprint mill white waters", Denver CO, May 6-10, 2000.

86 PAPTAC Annual Meeting: "The removal of detrimental dissolved and colloidal substances by a combined fungal and enzyme treatment", Montreal QC, Feb. 2nd, 2000.

Sustainable Forest Management Network BC workshop, Vancouver BC, Sept. 22, 1999.

Sustainable Forest Management Network AB workshop, Edmonton AB, Nov 10. 1998.

POSTER PRESENTATIONS

***9th International Conference on Biotechnology in the Pulp and Paper Industry*:** "The potential of using immobilized β-glucosidase in enzymatic hydrolysis of lignocellulosic substrates", Durban, South Africa, October 10-14th, 2004

25th Symposium on Biotechnology for Fuels and Chemicals, Breckenridge, Colorado, May 4-7, 2003, six poster presentations.

1) "Using HPLC/ELSD methods to quantify oligosaccharides and determined cellulose molecular weight distribution during enzymatic hydrolysis of cellulose", Dan Xie, Xiao Zhang and John N. Saddler

2) "A quantitative approach to studying the effects of sugar inhibition on cellulase and β-glucosidase during enzymatic hydrolysis of softwood substrates", Zhizhuang Xiao, Xiao Zhang, David Gregg and John N. Saddler

3) "High consistency hydrolysis of softwood substrates", Zhizhuang Xiao, Xiao Zhang, David Gregg and John N. Saddler

4) "Immobilization of β-glucosidase on Eupergit C for cellulose hydrolysis", Maobing Tu, Xiao Zhang and John N. Saddler

5) "Softwood to Ethanol Process Design and Optimization", Olga Mirochnik, Xiao Zhang, David J. Gregg, Sheldon J. B. Duff, Claudio Arato, John N. Saddler

6) "Enhanced Enzymatic Hydrolysis of Steam-Exploded Douglas-Fir Wood by Alkali-Oxygen Post-treatment", Xuejun Pan, Xiao Zhang**,** David J. Gregg and John N. Saddler,

***24th Symposium on Biotechnology for Fuels and Chemicals*:** "Acetic acid pretreatment for softwood bioconversion", Gatlinburg, Tennessee, April 28 – May 1, 2002

***Sustainable Forest Management Network Conference*:** "The different effects of white water dissolved and colloidal fractions on the paper properties", Edmonton Albert, February 15-17, 1999

7th *International Conference on Biotechnology in the Pulp and Paper Industry*: "Fungal treatment of organic contaminants present in the white water of a thermomechanical pulp mill", Vancouver, BC Canada, June 16-19, 1998