# International Symposium on Biorefining, Papermaking, and Lignocellulosic Materials 2020 (ISBPLM 2020) May 20-22, 2020 Tianjin University of Science & Technology, Tianjin, China

# The First Announcement

The International Symposium on Biorefining, Papermaking, and Lignocellulosic Materials 2020 (ISBPLM 2020) will be held in Tianjin, China on May 20-22, 2020. The symposium will be sponsored and organized by Tianjin University of Science & Technology (TUST), Nanjing Forestry University (NFU), South China University of Technology (SCUT), Shaanxi University of Science & Technology (SUST) and Qilu University of Technology (QUT), and co-sponsored and co-organized by Tianjin Technical Association of Paper Industry.

Please be advised that the former IPEC (TUST), ICPPB (NFU) and ISETPP (SCUT) have been merged to ISBPLM, reflecting one conference name. The ISBPLM will be hosted rotationally by the five universities mentioned above from now on.

The purpose of the symposium is to showcase the latest developments in the fields of biorefining, pulping, papermaking, lignocellulosic materials, and biomass conversion in the perspective of chemistry, engineering, and environment and to promote the research in the fields. Please visit the symposium website later for more information: http://www.isbplm2020.com.

# CALL FOR PAPERS

You are invited to submit your presentation to the Scientific Committee of the Symposium on the following topics:

Topics for ISBPLM 2020

- > Plant fiber chemistry and new analytical methods
- > Pulping and bleaching chemistry, high yield pulping, fiber recycling and non-wood pulping
- > Papermaking chemistry and engineering, finishing, coating and converting
- > Equipment and process control on pulping, papermaking, and biorefinery
- > Environment issues in pulp and paper industry
- > Nanotechnology, nanofiber and nanocellulose-based functional materials
- > Biomass conversion to fuels, chemicals and materials
- Printing and graphics processing

English is the official language of the symposium. All manuscripts should be written in English.

# TIMETABLE (DATES & DEADLINES)

- Extended abstracts submitted December 31, 2019
- Acceptances notified February 20, 2020
- Early-bird registration ends March 31, 2020
- Main symposium May 20-22, 2020

## ORGANIZATION

Sponsored and Organized by:



Tianjin Key Laboratory of Pulp and Paper, Tianjin University of Science & Technology



State Key Laboratory of Pulp and Paper Engineering, South China University of Technology



Jiangsu Provincial Key Lab of Pulp and Paper Science and Technology, Nanjing Forestry University



Shaanxi Provincial Key Laboratory of Papermaking Technology and Specialty Paper Development, Shaanxi University of Science & Technology



State Key Laboratory of Biobased Material and Green Papermaking, Qilu University of Technology

#### Co-Sponsored and Co-Organized by:

Tianjin Technical Association of Paper Industry.

#### **Conference Chairman**

Prof. Fuping Lu Tianjin University of Science & Technology, Tianjin, China

#### **Co-Chairs**

Prof. Fangong Kong	Qilu University of Technology, Jinan, China
Prof. Yongcan Jin	Nanjing Forestry University, Nanjing, China
Prof. Yingwei Li	South China University of Technology, Guangzhou, China
Prof. Meiyun Zhang	Shaanxi University of Science & Technology, Xian, China

### **Organizing Committee**

Tianjin University of Science & Technology, China
Tianjin University of Science & Technology, China
Tianjin University of Science & Technology, China
Tianjin University of Science & Technology, China
Shaanxi University of Science & Technology, China
Qilu University of Technology, China
South China University of Technology, China
Nanjing Forestry University, China

#### Scientific Committee (To be updated)

Prof. Bowen Cheng (Chairman)

Tianjin University of Science & Technology, China

Prof. Qingxi Hou (Executive Chairman) Tianjin University of Science & Technology, China Prof. Christine Chirat Ecole Française de Papeterie et des Industries Graphiques, France Prof. Jorge Colodette Universidade Federal de Viçosa, Brazil Assoc. Prof. Pedram Fatehi Lakehead University, Canada Prof. Monica EK KTH, Sweden Prof. Kazuhiko Fukushima Nagoya University, Japan Assoc. Prof. Magdi E. Gibril University of Gezira, Sudan Prof. Derek Gray McGill University, Canada Prof. Liangbing Hu University of Maryland (Park), USA Prof. Hasan Jameel North Carolina State University, USA Dr. Md Sarwar Jahan BCSIR Laboratories, Bangladesh Prof. Tetsuo Kondo Kyushu University, Japan Prof. Dominique Lachenal Ecole Française de Papeterie et des Industries Graphiques, France Prof. Hak Lae Lee Seoul National University, Korea Prof. Shijie Liu State University of New York, USA Prof. Yonghao Ni University of New Brunswick, Canada Prof. Hiroshi Ohi Tsukuba University, Japan Prof. James A. Olson The University of British Columbia, Canada Prof. Xuejun Pan University of Wisconsin- Madison, USA Prof. John Ralph University of Wisconsin- Madison, USA Prof. Orlando Rojas The University of British Columbia, Canada Prof. Thomas Rosenau Boku, Austria Prof. Jack Saddler The University of British Columbia, Canada Prof. Pekka Salminen Trinseo Europe GmbH, USA Prof. Toshiaki Umezawa Kyoto University, Japan Prof. Yasumitsu Uraki Hokkaido University, Japan Prof. Huining Xiao University of New Brunswick, Canada Dr. Tomoya Yokoyama The University of Tokyo, Japan Prof. Hye Jung Youn Seoul National University, Korea Prof. Kai Zhang University of Goettingen, Germany Dr. Xuejun Zou FPinnovations, Canada Prof. Lihui Chen Fujian Agriculture & Forestry University, China Institute of Chemistry Industry of Forest Products, CAF Prof. Guigan Fang Prof. Shiyu Fu South China University of Technology, China Prof. Hongqi Dai Nanjing Forestry University, China Prof. Yongcan Jin Nanjing Forestry University, China Prof. Fangong Kong Qilu University of Technology, China Prof. Yingwei Li South China University of Technology, China Prof. Zhijian Li Shaanxi University of Science & Technology, China Prof. Chuanfu Liu South China University of Technology, China Prof. Hongbin Liu Tianjin University of Science & Technology, China Prof. Xueren Qian Northeast Forestry University, China Prof. Chuanling Si Tianjin University of Science & Technology, China Prof. Runcang Sun Dalian Polytechnic University of Technology, China Prof. Lijun Wang Zhejiang University of Science & Technology, China

Prof. Qiang Wang	Qilu University of Technology, China
Prof. Shuangfei Wang	Guangxi University, China
Prof. Weibing Wu	Nanjing Forestry University, China
Prof. Feng Xu	Beijing Forestry University, China
Prof. Yongjian Xu	Shaanxi University of Science & Technology, China
Prof. Guihua Yang	Qilu University of Technology, China
Prof. Meiyun Zhang	Shaanxi University of Science & Technology, China

#### FORMAT FOR THE EXTENDED ABSTRACT

The example below shows the format for preparing your extended abstract. Please prepare your abstract accordingly. You should include the sections of ABSTRACT, INTRODUCTION, EXPERIMENTAL, RESULTS AND DISCUSSION, CONCLUSIONS, AND REFERENCES in your extended abstract. You can add figures and tables.

#### NOTICES:

- Extended abstract must be submitted by 24:00, December 31, 2019 (CST).
- > Extended abstract should be not shorter than 4 pages and not longer than 8 pages.
- > Please send your extended abstract as a docx file to isbplm2020@tust.edu.cn.
- All accepted extended abstracts will be distributed to attendances as an electric file at the ISBPLM 2020.

Efficient and value-added utilization for biomass in paper industry: Effect of surface lignin produced in autohydrolysis of poplar sapwood chips on the subsequent alkali impregnation (*Here please indicate whether oral or poster presentation application*)

Zhen Yue<sup>1</sup>, Qingxi Hou<sup>1\*</sup>, Wei Liu<sup>1</sup>, Honglei Zhang<sup>1</sup>, and Qiulin Yang<sup>1</sup>

- <sup>1</sup> Tianjin Key Laboraratory of Pulp and Paper, Tianjin University of Science & Technology, Tianjin, China
- \* Corresponding author's e-mail address: <u>qingxihou@tust.edu.cn</u>

(NOTES: Please replace the above title, author names, affiliations, and corresponding author's email address with yours. Presenter's name should be underlined. Please delete here (these lines with these red letters) when you will have completed to prepare your extended abstract.)

#### ABSTRACT

This work investigated the effect of autohydrolysis pretreatment on the impregnation performance of poplar sapwood chips in an alkali impregnation process of chemi-mechanical pulping. At first, the physical properties (volume porosity and total pore volume) and chemical compositions (surface lignin, hemicelluloses, acetyl groups, and lignin) of autohydrolyzed poplar sapwood chips were explored. Then the impregnation effectiveness of the autohydrolyzed sapwood chips against NaOH solution were studied. Moreover, the effects of surface lignin on the subsequent alkali impregnation were investigated by stepwise regression analysis. The results indicated that the existence of the surface lignin had nearly no impact on the subsequent alkali impregnation in making chemimechanical pulp as compared to the volume porosity, and that the effect of physical properties of autohydrolyzed poplar sapwood chips on alkali impregnation in chemi-mechanical pulping process was much greater than that of chemical composition. Finally, it can be further concluded that autohydrolysis can facilitate the subsequent alkali impregnation of the autohydrolyzed sapwood chips in making chemi-mechanical pulp, which would be of significance for the combination of biomass refinery and pulp and paper industry.

#### INTRODUCTION

Autohydrolysis pretreatment (AHP), an economical, environmentally friendly and

promising pretreatment technology,<sup>[1]</sup> is a procedure that refers to treatment with hot water at elevated temperatures and high pressures to retain its liquid form.<sup>[2]</sup> When AHP is applied prior to making high-yield pulp, especially chemimechanical pulp (CMP), some amount of hemicelluloses can be easily recovered in advance for further producing high value-added biomassbased products, keeping them from both dissolving in the pulping effluent and being wasted.<sup>[3]</sup>

#### **EXPERIMENTAL**

#### Materials

A 4-year-old poplar stem wood disc was obtained in Tianjin, China. The poplar sapwood was cut into chips with a dimension of  $30 \times 30 \times 10 \text{ mm}^3$  (Axial, A × Tangential, T × Radial, R). Then the chips were washed with deionized water and air-dried.

#### **Autohydrolysis Pretreatment**

The autohydrolysis pretreatment was performed in a 6 L digester (M/K systems Inc., USA) equipped with a centrifugal pump for liquor circulation. The poplar sapwood chips were added in the digester, and then mixed with the preheated deionized water at a solid/ liquid ratio of 1:10 kg/L.

#### **RESULTS AND DISCUSSION**

# Physical and chemical properties of poplar sapwood chips after AHP

As shown in Table 1, AHP led to significant decreases in the acetyl group and xylan contents. The contents of acid insoluble lignin and acid soluble lignin of poplar sapwood chips both decreased gradually as the CHF rose, and that the content of acid insoluble lignin reached its minimum value of 17.17% at CHF = 87.06 and only increased a little at CHF = 130.59. According to the literature,<sup>[9-10]</sup> this phenomenon indicates that some of the condensed-lignin and pseudo-lignin formed in the AHP could redeposit on the autohydrolyzed s a p w o o d c h i p s a s t h e C H F

CHF	Control	2.78	5.56	10.77	24.54	49.08	73.63	87.06	130.59
Autohydrolysis temperature (K)		393.15	403.15	403.15	433.15	433.15	433.15	443.15	443.15
Autohydrolysis time (min)		30	30	30	20	40	60	30	60
Xylan <sup>a</sup> (%)	18.02	17.07	16.87	16.31	15.06	12.78	10.48	7.49	6.61
Acetyl group <sup>a</sup> (%)	6.22	5.64	5.46	5.13	4.18	4.12	2.94	1.90	1.66
Acid-insoluble lignin (%)	23.72	22.92	22.00	21.80	21.22	19.44	18.23	17.17	18.33
Acid soluble lignin (%)	3.60	3.45	3.37	3.22	3.14	2.93	2.48	1.60	1.59
Surface lignin concentration (%)	88.24	80.12	81.42	84.61	87.36	88.60	90.80	95.44	97.66
Volume porosity (%)	76.22	75.73	76.83	76.99	78.23	78.29	79.28	79.81	80.30
Total pore volume <sup>b</sup> (×10 <sup>-3</sup> cm <sup>3</sup> /g)	2.44	3.07	3.37	3.84	3.89	4.53	7.68	9.09	9.68

**Table 1**. Effect of AHP on the properties of poplar sapwood chips.





was high in particular. It can be found that the higher the CHF, the higher the surface lignin.

#### CONCLUSIONS

The droplet spheres on the surface of autohydrolyzed poplar sapwood chips were proved to be lignin or its condensation structure. The surface lignin content increased with raising the level of autohydrolysis intensity, and the exterior surface had more lignin than the interior one. The presence of the surface lignin had nearly no effect on the subsequent alkali impregnation compared to the volume porosity. Autohydrolysis can facilitate the alkali impregnation of autohydrolyzed poplar sapwood chips in making CMP.

#### ACKNOWLEDGEMENTS

This work was financially supported by the Natural Science Foundation of China (Grants 31570574 and 31770634), Natural Science Foundation of Tianjin City (17JCYBJC20600), and State Key Laboratory of Pulp and Paper Engineering (201823).

#### REFERENCES

- Yu, G., Yano, S., Inoue, H., Inoue, S., Endo, T., Sawayama, S., "Pretreatment of rice straw by a hotcompressed water process for enzymatic hydrolysis", *Appl. Biochem. Biotechnol.*, **160**, 539–551(2010)
- [2] Brodeur, G., Yau, E., Badal, K., Collier, J., Ramachandran, K.B., Ramakrishnan, S., "Chemical and physicochemical pretreatment of lignocellulosic biomass: A review", *Enzyme Res*, 2011, 787532 (2011)

#### Activity of Oral and Poster Competitions for graduate students

During the period of the ISBPLM 2020, there will be a special activity of oral and poster competitions for graduate students who are interested in pulp, paper, biorefinery, and biomaterial research. All of graduate students interested are encouraged to submit the extended abstract. The activity will offer 3 prizes for each competition after oral and poster presentations.