

RII Track-2 Outputs

Book Chapters

- Harjoyti Kalita, Deep Kalita, Samim Alam, Andrey Chernykh, Ihor Tarnavchyk, James Bahr, Satyabrata Samanta, Anurad Jayasooriyama, Shashi Fernando, Sermadurai Selvakumar, Dona Suranga Wickramaratne, Mukund Sibi, and Bret J. Chisholm (2015). Novel Bio-Based Polymers for Coatings Applications. *Eco-Friendly Green Coatings* Wiley-Scrivener. Status = SUBMITTED; Acknowledgement of Federal Support = Yes
- Harjoyti Kalita, Samim Alam, Deep Kalita, Andrey Chernykh, Ihor Tarnavchyk, James Bahr, Satyabrata Samanta, Anurad Jayasooriyama, Shashi Fernando, Sermadurai Selvakumar, Andriy Popadyuk, Dona Suranga Wickramaratne, Mukund Sibi, Andriy Voronov, Achintya Bezbaruah, Bret J. Chisholm (2014). Synthesis and Characterization of Novel Soybean Oil-Based Polymers and Their Application in Coatings Cured by Autoxidation. *Soy-Based Chemicals and Materials* 1178. American Chemical Society. 371. Status = PUBLISHED; Acknowledgement of Federal Support = Yes; Peer Reviewed = Yes; DOI: 10.1021/bk-2014-1178.ch016

Journals or Juried Conference Papers

- Christopher, L.P.; Yao, B.; Ji, Y. (2014). Lignin biodegradation with laccase-mediator systems. *Frontiers in Energy Research*. 2 (12). Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: 10.3389/fenrg.2014.00012
- Ivana Brzonova, Evguenii Kozliak, Alena Kubátová, Michelle Chebeir, Wensheng Qin, Lew Christopher, Yun Ji (2014). Kenaf biomass biodecomposition by Basidiomycetes and Actinobacteria in submerged fermentation for production of carbohydrates and phenolic compounds. *Bioresource Technology*. 173 352. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: 10.1016/j.biortech.2014.09.057
- Rajith S. Manan, Praveen Kilaru and Pinjing Zhao (2015). Nickel-Catalyzed Hydroimination of Alkynes. *Journal of the American Chemical Society*. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; DOI: 10.1021/jacs.5b02272
- Harjoyti Kalita, Samim Alam, Deep Kalita, Andrey Chernykh, Ihor Tarnavchyk, James Bahr, Satyabrata Samanta, Anurad Jayasooriyama, Shashi Fernando, Sermadurai Selvakumar, Dona Suranga Wickramaratne, Mukund Sibi, and Bret J. Chisholm (2015). Novel Biobased Polymers for Coatings Applications. *European Coatings Journal*. Status = AWAITING_PUBLICATION; Acknowledgment of Federal Support = Yes
- Asina, FNU; Brzonova, I.; Voeller, K.; Kozliak, E.; Kubátová, A.; Yao, B.; Ji, Y., Biodegradation of Lignin by Fungi, Bacteria and Laccases, *Bioresource Technology*, Status = AWAITING_PUBLICATION
- Jing Zhang, Ruja Shrestha, John F. Hartwig and Pinjing Zhao (). A Decarboxylative Approach for Regioselective Hydroarylation of Alkynes. *Nature Chemistry*. Status = UNDER_REVIEW; Acknowledgment of Federal Support = Yes
- Bílek, H.; Voeller, K.; Kreft, J.; Dostálková, A.; Kozliak, E.I.; Kubátová, A. (June 2016). Transition metal catalyzed lignin hydrotreatment and determination of products by GC-MS and thermal carbon analysis. ASMS conference. San Antonio, TX.
- Artemyeva, A.; Kubatova, A.; Kozliak, E.I. (June 2016). Optimization of size exclusion chromatography and atmospheric pressure ionization enabling characterization of intact lignin and its degradation products. 64th ASMS Conference on Mass Spectrometry and Allied Topics, San Antonio, TX. Status = OTHER; Acknowledgement of Federal Support = Yes
- Artemyeva, A.; Lilak, S.; DiProspero, T.; Kozliak, E.; Kubátová, A. (July 2016). A Novel Approach Towards Comprehensive Characterization of Lignin: Size Exclusion Chromatography in Combination with Electrospray Ionization Mass Spectrometry. 1st Annual International Symposium on Materials from Renewables Conference.

Fargo, ND. Status = OTHER; Acknowledgement of Federal Support = Yes

- Numan-Al-Mobin, M.; Kubatova, A.; Raynie, D.; and Smirnova, A. (*submitted*). "Synthesis of Phenolic Compounds from Alkali Lignin in a Mixture of Sub- and Supercritical Fluids" *Energy and Fuel*.
- Asina FNU; Brzonova, I.; Kozliak, E.; Kubátová, A.; Ji Y., Microbial Treatment of Industrial Lignin: Successes, Problems and Challenges, *Renewable and Sustainable Energy Reviews*, under review
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova, I.; Kozliak, E.; Ji, Y., Fungal Biotransformation of Lignin in the Presence of Dimethyl Sulfoxide (DMSO) into either Water Soluble or Insoluble Polymers (Anionic Hydrogel), *Biomacromolecules*, under review
- Kozliak, E.; Kubatova, A.; Artemyeva, A.; Nagel, E.; Zhang, C.; Rajappagowda, R.; Smirnova, A. Thermal Liquefaction of lignin to aromatic: Efficiency, selectivity and product analysis *ACS Sustainable Chemistry & Engineering*, under review.

Other Conference Presentations / Papers

- Brzonova, I.; Chebeir, M.; Kubatova, A.; Kozliak, E.; Christopher, L.P.; Ji, Y. (2013). *Biodegradation of kenaf biomass by Basidiomycetes and Actinobacteria for production of valuable low molecular weight carbohydrates and phenolics*. 15th Annual NIH SBIR/STTR Conference. Sioux Falls, SD. Status = OTHER; Acknowledgement of Federal Support = Yes
- Brzonova, I.; Chebeir, M.; Kubatova, A.; Kozliak, E.; Christopher, L.P.; Ji, Y. (2013). *Biodegradation of kenaf for production of low molecular weight phenolics*. Bio Pacific Rim Summit on Industrial Biotechnology and Bioenergy. San Diego, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Christopher, L.P.; Brzonova, I.; Chebeir, M.; Kubatova, A.; Kozliak, E.; and Ji, Y. (2014). *Selective generation of biomass-derived aromatic compounds by lignolytic microorganisms*. 5th Nordic Wood Biorefinery Conference. Stockholm, Sweden. Status = OTHER; Acknowledgement of Federal Support = No
- Lynde, C.; Numan-Al-Mobin, M.; Dixon, D.; Anderson, D.; Kubatova, A.; and Smirnova, A. (2014). Catalyst-free selective oxidation of alkali lignin in super- and subcritical water. Materials Research Society, Boston, MA.
- Seames, W. (Invited Presenter) "The Fatty Acid Biorefinery: A Commercially Viable Concept for the Production of Renewable Transportation Fuels and Chemicals" The University of Maine Chemical and Biological Engineering Distinguished Speakers Series, Orono, ME, April 11, 2014.
- Seames, W. (Invited Presenter) "The Fatty Acid Biorefinery: A Commercially Viable Concept for the Production of Renewable Transportation Fuels and Chemicals" Univ. of Leeds, Energy Leeds, Seminar series, Leeds, UK, 10/9/14
- Seames, W. (Invited plenary speaker) "An Example of the Impact of NSF EPSCoR Funding in Renewable Energy Research" NSF EPSCoR 2013 Annual Meeting, 11/2/14
- Lynde, C.; Numan-Al-Mobin, M.; Dixon, D.; Anderson, D.; Kubatova, A.; and Smirnova, A. (2015). Catalyst-free selective oxidation of alkali lignin in super- and subcritical water. Materials Research Society, Boston, MA.
- Numan-Al-Mobin, M.; Lynde, C.; Kolla, P.; Dixon, D.; Kubatova, A.; Smirnova, A. (2015). Sub- and supercritical water liquefaction of alkali lignin in presence of carbon dioxide and ammonia. 249th ACS National Meeting and Exposition, posters, Denver, CO, United States
- Hicks, J. M., Hoffmann, M. R. (2016). *Electronic Structure Calculations of Catalyzed Lignin Decomposition*. 251st American Chemical Society National Meeting. San Diego, CA. (poster presentation) March 15, 2016 Status = OTHER; Acknowledgement of Federal Support = Yes
- Pourjafar, S.; Seames, W.; Kubatova, A.; Kozliak, E. "Metal doped catalyst development for lignin liquefaction and optimization of the process variables using design of experiments" 251st American Chemical Society National Meeting, (poster presentation) March 15, 2016
- Artemyeva, A.; Lilak, S.; Kozliak, E.I.; Kubatova, A. (April 2016). Optimization of Size Exclusion Chromatography and Atmospheric Pressure Ionization Enabling Characterization of Intact Lignin and Its Degradation Products. ND EPSCoR Conference. Grand Forks, ND. Status = OTHER; Acknowledgement of Federal Support = Yes
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova I.; Kozliak, E.; Ji, Y. (2016) Changes in Chemistry

of Fugally Biotreated Lignin. ND EPSCoR/IDeA 2016 STATE CONFERENCE, Grand Forks, ND, USA. (poster presentation) April 19, 2016

- Asina, FNU; Brzonova, I.; Voeller, K.; Kozliak, E.; Kubátová, A.; Ji, Y. “A Comparative Study on Microbial and Enzymatic Degradation of Lignin”, 38th Symposium on Biotechnology for Fuels and Chemicals, Baltimore, April 25-28, 2016
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova I.; Kozliak, E.; Ji, Y. (2016) Renewable Biopolymers and Chemicals from Kraft Lignin, using Fungal Treatment. 38th Symposium on Biotechnology for Fuels and Chemicals. Baltimore, MD, USA. (poster presentation) April 25-28, 2016
- Artemyeva, A.; Kreft, J.; Voeller, K.; Bilek, J.; Dostalkova, A.; Kozliak, E.I.; Kubatova, A. (May 2016). *Essential Approaches to Characterization of Lignin Hydrotreatment Products*. 47th Central Regional Meeting of the American Chemical Society, Covington, KY. Status = OTHER; Acknowledgement of Federal Support = Yes
- Ji, Y. Renewable Chemical and Fuels from Lignin, Invited talk to USDA Eastern Regional Research Center, May 17, 2016 (oral presentation)
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova I.; Kozliak, E.; Ji, Y. (2016) Biomaterial Derived from Fungal Treated Kraft Lignin. 10th World Biomaterials Congress, Montréal, Canada. (poster presentation) May 17 – 22, 2016
- Seames, W.; Kreft, J.; Bilek, H.; Voeller, K.; Pourjafar, S. (presenter); Dostalkova, A.; Kubatova, A.; Kozliak, E. “Lignin Degradation via Hydrothermal Treatment with Doped Silica/Alumina Based Catalysts and Essential Approaches to characterization of Lignin Following Hydrotreatment” 1st International Symposium on Materials from Renewables, Fargo, ND, 7/19/16
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova I.; Kozliak, E.; Ji, Y. (2016) Biomodification of Dimethyl Sulfoxide Solubilized Kraft Lignin with Immobilized Fungi for Industrial Application. 1st International Symposium on Materials and Renewables, Fargo, ND, USA. (poster presentation) July 19-20, 2016
- Brzonova, I.; Asina, FNU; Artemyeva, A.; Kubatova, A.; Smoliakova I.; Kozliak, E.; Ji, Y. (2016) Lignin for Biomedical Application: Potential and Challenges. 1st International Symposium on Materials and Renewables, Fargo, ND, USA. (oral presentation) July 19-20, 2016
- Kreft, J.; Bilek, H.; Voeller, K.; Pourjafar, S. (presenter); Kubatova, A.; Seames, W.; Kozliak, E.; Dostalkova, A. “Lignin Degradation Via Hydrothermal Treatment with Doped Silica/Alumina Based Catalysts and Essential Approaches to Characterization of Lignin Following Hydrotreatment” AIChE Annual Meeting, San Francisco, CA, 11/13/16
- Pourjafar, S; Seames, W.; Tande, B.; Kreft, J.; Kubatova, A. “An Investigation of the Degradation of Lignin in Sub-Super Critical Water in a Continuous Flow Reactor” AIChE Annual Meeting, San Francisco, CA 11/13/16

Other Products

- *Audio or Video Products:* Developed 5 of the 10 web-video learning modules for Dakota Science Center website.
- *Educational aids or Curricula:* Analytical laboratory and research projects for the CERAIS program at Turtle Mountain Tribal College.
- *Instruments or Equipment:* At UND, Dr. Seames’ group is designing a novel, turbulent flow reactor for the non-catalytic decomposition of lignin that inhibits tar and coke coating onto the reactor walls.
- *Instruments or Equipment:* At UND, a room for web meetings was upgraded to enable/improve communication for collaborative Adobe Connect discussions of 4 institutions as well as space for research meetings.
- *Instruments or Equipment:* Dr. Gu’s group developed a hyphenated chemical adsorption analyzer by interfacing an Auto Chem-II analyzer with vapor generator to Shimadzu QP 2010 GC-MS system with a data/signal transfer cable and sample transfer heating capillary tube to characterize catalysts. The specific system is unique for testing the surface chemical functional groups of catalysts with detecting gases, and evaluating catalysts with model substrates.
- *Instruments or Equipment:* Mobile training laboratory trailer for the Power ON! program.

Other Publications

- Alena Kubátová, Keith Voeller, Alžběta Dostálková, Evgenii Kozliak (2014). *Comprehensive Characterization of Lignin Hydrotreatment Products Using a Carbon Analyzer and Thermal Desorption/Pyrolysis Coupled with Gas Chromatography*. Presentation at Frontiers in Biorefining conference, Oct 21-24, 2014, St. Simons Island, GA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patents

- *MONOMERS AND POLYMERS DERIVED FROM NATURAL PHENOLS*. Patent No. PCT/US2014/0231. UNITED STATES. Application Date = 03/11/2014. Status = Pending
- *Novel Monomers from Biomass*. Patent No. 62/035,197. UNITED STATES. Application Date = 08/08/2014. Status = Pending
- *Acetoacetylated Lignin and Thermosets Therefrom*. Patent No. 62/150,504. UNITED STATES. Application Date = 04/21/2015. Status = Pending
- *Epoxy Resin Derived From Vanillin and Thermosets Therefrom*. Patent No. 62/150,422. UNITED STATES. Application Date = 04/21/2015. Status = Pending

Thesis/Dissertations

- Jing Zhang. *New Strategies for Ruthenium Catalyzed C-C Bond Formation*. (2015). North Dakota State University. Acknowledgement of Federal Support = No
- Asina FNU, UND Biodegradation of Lignin By Fungi, Bacteria and Laccase, M.S. thesis, May, 2016
- Keith Voeller, UND January 2014- December 2015 a MS in Analytical Chemistry Thesis: "Characterization of Kraft lignin and products of its thermal degradation by fractional pyrolysis method."