

# **Bernard Wiredu, PhD**

Center for Energy & Environmental Sustainability/Department of Physics & Chemistry  
Prairie View A&M University, Prairie View TX 77446

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## ***HOME ADDRESS***

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## ***HIGHLIGHTS OF SKILLS***

- Extensive experience in multi-step organic synthesis, catalysis and catalyst development
- Very knowledgeable in biomass processing to various chemical platforms and liquid biofuels
- Extensive skills and experience in polymer synthesis and characterization
- Developed novel Brönsted acidic ionic liquid catalyst system and methodologies to convert untreated cellulose and raw biomass to liquid biofuels and other high density jet fuels
- Conducted laboratory experiments to screen for zeolites of different Al/Si ratios as co-catalyst with novel acidic ionic liquid for rapid hydrolysis of cellulose to ethyl levulinate and levulinic acid.
- Developed analytical techniques for the analysis, identification and quantification of complex analytes derived from cellulose saccharification and degradation using GC-MS employing FID
- Routinely used high pressure/tempeature reactors and equipment such as Parr reactors
- Strong background in structural identification and characterization of organic compounds.
- Experience with designing complex experiments, setting up and running bench top equipment employing appropriate technology.
- Very knowledgeable in the use of characterization methods and analytical instrumentation such as  $^1\text{H}$  and  $^{13}\text{C}$  NMR (1-D and 2-D), UV-VIS, FTIR and Atomic Absorption spectroscopy, GC-MS, LC-MS, AFM and various chromatographic techniques.
- Strong leadership and communication skills
- Ability to coordinate and work corroboratively with peers and subordinates to achieve and exceed expected results
- Excellent computer skills with experience in various electronic chemical software and their application i.e. Chem. office, Sybyl-X using Linus-based Systems and applications

## ***CURRENT RESEARCH INTEREST AND TEACHING ASSIGNMENT***

- Developing of new acidic ionic liquid catalyst systems and methodologies for cellulosic-ethanol process.
- Developing synthetic and bio-based polymers and catalyst for industrial and medicinal application.
- Identification, characterization, processing and conversion of lignocellulosic biomass to liquid biofuels and other fine chemicals.
- Teaches undergraduate organic chemistry I & II and their associated labs
- Guide, assist and help in supervising undergraduate and graduate students with research

## ACADEMIC BACKGROUND

▪ 2008	Ph.D.	Chemistry	Kansas State University, Manhattan
▪ 2002	MPhil 1.	Chemistry	University of Ghana, Legon
▪ 2000	BSc	Chemistry	University of Ghana, Legon.

## DOCTORAL DISSERTATION

- A Novel Classical Synthetic Approach to Carbon Nanotubes and their Functionalized Derivatives.

## PROFESSIONAL BACKGROUND/EMPLOYMENT

2013- Present	Research Fellow	Center for Energy & Environmental Sustainability, PVAMU
2011 - 2013	Teaching/Research Associate	Prairie View A&M University, Prairie View
2009 - 2010	Post-doctoral Researcher	The University of Kansas, HBC Lawrence
2000 - 2001	Research Assistant	University of Ghana, Legon
1997 – 1998	Science Instructor	Young Christian School, Takoradi, Ghana
1996 - 1997	Laboratory Assistant	Prempeh College, Sci. Res. Center, Kumasi

## PUBLICATIONS

### Peer Reviewed Journal Articles

**Bernard Wiredu, Ananda S. Amarasekara**, The effect of metal ions as co-catalysts on 1-(1-propylsulfonic)-3-methylimidazolium chloride acidic ionic liquid catalyzed hydrolysis of cellulose in water. *Applied Catalysis A: General*. 2015, submitted, 01/09/2015

Ananda S. Amarasekara, **Bernard Wiredu**, Dre'Langala N. Edwards.  $\gamma$ -Valerolactone from pyrolysis of calcium salts of levulinic-formic acid mixtures derived from cellulose, *Biomass and Bioenergy*, 2015, 72, 39 - 44

Ananda S. Amarasekara. **Bernard Wiredu** Acidic ionic liquid catalyzed liquefaction of cellulose in ethylene glycol; identification of a new cellulose derived cyclopentenone derivative". *Industrial & Engineering Chemistry Research*, December 2014, ASAP, DOI: 10.1021/ie504544s

**Bernard Wiredu, Julie N. Dominguez**, Ananda S. Amarasekara. The effects of zeolites on ionic liquid catalysed one-pot conversion of cellulose to ethyl levulinate and levulinic acid in aqueous ethanol. *Renewable Energy*, 2014, submitted 12/06/2014

**Bernard Wiredu**, Ananda S. Amarasekara. Acidic ionic liquid catalyzed one-pot conversion of cellulose to ethyllevulinate and levulinic acid in ethanol-water solvent system. *BioEnergy Research*, 2014, 7(4), 1237-1243

**Bernard Wiredu**, Ananda S. Amarasekara. Synthesis of a silica immobilized Brönsted acidic ionic liquid catalyst and hydrolysis of cellulose in water under mild conditions. *Catalysis Communications* (2014), 48, 41-44.

Ananda S. Amarasekara, Ashfaqur Razzaq, Robert Caballero, **Bernard Wiredu**. Sol-gel synthesis, characterization and water vapor adsorption properties of 1,1'-(1,6-hexanediyl)-bis(imidazolium)dichloride-silica hybrid material. *Journal of Sol-Gel Science and Technology* (2014), 69(2), 345-350.

**Bernard Wiredu**, Ananda S. Amarasekara. Synthesis of an immobilized Brönsted acidic ionic liquid catalyst and hydrolysis of cellulose in water under mild conditions. *Current Catalysis*, **2013**, 2(3), 219-224.

Ananda Sarath Amarasekara, **Bernard Wiredu**. Single reactor conversion of corn stover biomass to C5–C20 furanic biocrude oil using sulfonic acid functionalized Brönsted acidic ionic liquid catalysts. *Biomass Conversion and Biorefinery*, **2014**, 4:149 – 155.

Ananda Sarath Amarasekara, **Bernard Wiredu**, and Ashfaqur Razzaq. Vanillin based polymers: I. An electrochemical route to polyvanillin. *Green Chemistry* (2012), 14, (9), 2395-2397.

Ananda Sarath Amarasekara, **Bernard Wiredu**. A comparison of the use of dilute aqueous p-toluenesulfonic acid and sulfuric acid in single step pretreatment - saccharification of corn stover at moderate temperatures and pressures. *Bioresource Technology* (2012), 125, 114-118.

Ananda Sarath Amarasekara, **Bernard Wiredu**. Bronsted acidic liquid 1-(1-propylsulfonic)-3-methylimidazolium chloride catalyzed hydrolysis of D-cellobiose in aqueous medium. *International Journal of carbohydrate chemistry* (2012), 948652, 6 pp

Amarasekara, Ananda; Callis, Brandon; **Wiredu, Bernard**. Synthesis and characterization of branched polymeric ionic liquids with imidazolium chloride segments. *Polymer Bulletin* **2012**, 68(4), 901-908.

Amarasekara, Ananda S.; **Wiredu, Bernard**. Aryl sulfonic acid catalyzed hydrolysis of cellulose in water. *Applied Catalysis, A: General* (2012), 417-418, 259-262.

Ananda S. Amarasekara, **Bernard Wiredu**. Degradation of cellulose in dilute aqueous solutions of acidic ionic liquid 1-(1-propylsulfonic)-3-methylimidazolium chloride, and p-toluenesulfonic acid at moderate temperatures and pressures. *Industrial & Engineering Chemistry Research*, **2011**, 50(21), 12276-12280.

Kaiyan Lou, Allan M. Prior, **Bernard Wiredu**, John Desper, and Duy H. Hua. Synthesis of Cyclododeciptycene Quinones. *J. Am. Chem. Soc.* **2010**, 132(49), 17635-17641.

Wang, Y.; Perchellet, E. M.; Ward, M. M.; Lou, K.; Zhao, H.; Battina, S. K.; **Wiredu, B.**; Hua, D. H.; and Perchellet, J.-P. H. Antitumour triptycene analogs induce a rapid collapse of mitochondrial transmembrane potential in HL-60 cells and isolated mitochondria. *International Journal of Oncology*, **2006**, 28(1), 161-172

#### *Book Chapters*

Ananda Sarath Amarasekara, **Bernard Wiredu**. "A comparison of the use of dilute aqueous p-toluenesulfonic acid and sulfuric acid in single step pretreatment - saccharification of biomass". *Fuelling the Future: Advances in Science and Technologies for Energy Generation, Transmission and Storage*, BrownWalker Press, 2012, 3-8

#### *Conference Proceedings and Presentations*

Ananda S. Amarasekara and **Bernard Wiredu**. Single reactor Conversion of Lignocellulosic Biomass to Furanic Biocrude Oils using Brönsted Acidic Ionic Liquid Catalysts. 2<sup>nd</sup> International Congress on Catalysis for Biorefineries, 22<sup>nd</sup> – 25<sup>th</sup> September 2013, Dalian, China.

Ananda S. Amarasekara and **Bernard Wiredu**. A comparison of the use of dilute aqueous *p*-toluenesulfonic acid and sulfuric acid in single step pretreatment - saccharification of biomass. The *Energy and Materials Research Conference*, Torremolinos, Spain; 20-22 June 2012

Ananda S. Amarasekara and Bernard Wiredu. Degradation of cellulose in aqueous solutions of acidic ionic liquids at moderate temperatures and pressures. *XIX ISAF: International Symposium on Alcohol Fuels*, Verona, Italy October 10<sup>th</sup>- 14<sup>th</sup>, 2011.

Prior, Allan M.; **Wiredu, Bernard**; Lou, Kaiyan;; Desper, John; Hua, Duy H. Synthesis of Cyclododeciptycene quinones 45th Midwest Regional Meeting of the American Chemical Society, Wichita, KS, United States, October 27-30 (**2010**), MWRM-350.

Cunningham, C. W.; Mukhopadhyay, A.; **Wiredu, B.**; Blagg, B. S. J.; Krise, J. P.; Prisinzano, T. E. Synthesis, cellular uptake, and cellular localization of fluorescent probes. *15<sup>th</sup> Annual Symposium for the NIH Dynamic Aspects of Chemical Biology Training Grant*, Lawrence, KS, 2009.

Cunningham, C. W.;<sup>†</sup> **Wiredu, B.**;<sup>†</sup> Mihelcic, J.; Prisinzano, T. E.; Blagg, B. S. J. Inverse-demand Diels-Alder cycloaddition as a tool for bioorthogonal conjugation reactions within cells. *KU-CMLD*, Lawrence, KS, **2009**.

Aquilar A., Virdi S., **Wiredu B.**, Regehr K. J., Wangemann P., Hua D.H. Studies toward a total synthesis of (+)-Myriceric Acid A. *39<sup>th</sup> Midwest Regional Meeting of the American Chemical Society*, Manhattan, KS; MID04-265, page 254, **2004**

Wu, H.-C.; Peterson, E.; Battina, S.; Jimenez, A.; **Wiredu, B.**; Iwamoto, T.; Radke, G. A.; Li, Q.; Xu, C.; Wang, J.; Jin, L.-W.; Hua, D. H. Tricyclic pyrones that Block beta-sheets formation and aggregation of Alzheimers amyloid beta-40 peptide. *39<sup>th</sup> Midwest Regional Meeting of the American Chemical Society*, Manhattan, KS; MID04-324, page 288, **2004**

Lou, K.; Huang, X.; Brown, N.; Zhao, H.; **Wiredu, B.**; Hua, D. H. Synthesis of functionalized beltenes for self-assembled nanomaterials; *39<sup>th</sup> Midwest Regional Meeting of the American Chemical Society*, Manhattan, KS; MID04-016, **2004**

### ***HONORS AND AWARDS***

2002 – 2008	Kansas State University	Graduate Teacher/Research Fellow
2002 - 2003	Kansas State University	ISEP Scholarship
1999 - 2000	University of Ghana	Otumfour Scholarship

### ***LEADERSHIP ACTIVITIES***

2001 – 2002	Secretary, Students Chemical Society	Univ. of Ghana, Legon
2005 – 2007	President, African Students Union	Kansas State Univ. Manhattan

### ***PROFESSIONAL AFFILIATIONS***

American Chemical Society, USA  
Royal Chemical Society, UK

