

# Antonio C. Freitas dos Santos, Ph.D.

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02/22/2020

## EDUCATION

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- Postdoctoral Researcher, Laboratory of Renewable Resource Engineering** 2018-Present  
Purdue University, West Lafayette, IN  
**Research Area:** “Protein diffusion in heterologous matrices”  
**Advisor:** Michael Ladisch
- Ph.D., Agricultural & Biological Engineering** 8/2018  
Purdue University, West Lafayette, IN  
**Dissertation:** “Enzymatic inhibition by lignin during second generation ethanol production”  
**Advisor:** Michael Ladisch
- M.S. Agricultural & Biological Engineering** 12/2016  
Purdue University, West Lafayette, IN  
**Thesis:** “Protein adsorption impact on enzyme hydrolysis of pretreated sugarcane bagasse”  
**Advisor:** Michael Ladisch
- Pharm. D. Pharmacy and B.S. Biochemistry** 12/2013  
University of São Paulo, São Paulo, Brazil  
**Thesis:** “Production of biopolymers through fermentation”  
**Advisor:** João Carlos Monteiro de Carvalho

## RESEARCH EXPERIENCE

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- Protein diffusion on heterologous matrices,** 2018 – Present  
Purdue University, West Lafayette, IN
- Study the protein diffusion in polymer matrices
  - Investigate the impact of protein and polymer characteristics on diffusion
- Evaluation of biomass slurries physico-chemical characteristics** 2017 –Present  
Purdue University, West Lafayette, IN
- Study the physical behavior of biomass slurry during conversion of lignocellulose
  - Investigate rheology impact on enzyme hydrolysis efficiency
  - Investigate effects of liquefaction of biomass on its characteristics and enzyme hydrolysis

**Protein adsorption impact on enzyme hydrolysis of biomass**

2014 – 2018

Purdue University, West Lafayette, IN

- Study the adsorption behavior of cellulase enzyme components on pretreated biomass materials and lignin
- Investigate enzyme deactivation and inhibition by lignin
- Investigate the impact of blocking agents on enzyme activity and enzyme hydrolysis yield

**Production of biopolymers through fermentation**

2010 – 2012

Institute of Technological Research, São Paulo, Brazil

- Development of recombinant *Escherichia coli*
- Identification of novel polyhydroxyalkanoates producing microorganisms

**TEACHING EXPERIENCE**

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**Graduate Teaching Assistant**

Spring 2018

Agricultural &amp; Biological Engineering, Purdue University

- ABE 580: Process Engineering Of Renewable Resources
- Contributed to course, assignment and lecture planning
- Taught 8 lectures on enzyme processes and modelling of enzyme activity
- Graded assignments and held office hours to further instruct students

**PUBLICATIONS**

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1. **dos Santos, A. C.F.**; Ximenes, E.; Kim, Y.; Ladisch, M. R. Lignin–Enzyme Interactions in the Hydrolysis of Lignocellulosic Biomass. *Trends Biotechnol.* 2019, 37 (5), 518–531. <https://doi.org/10.1016/J.TIBTECH.2018.10.010>.
2. Zhang, L.; **dos Santos, A. C. F.**; Ximenes, E.; Ladisch, M. Proteins at Heterogeneous (Lignocellulose) Interfaces. *Curr. Opin. Chem. Eng.* 2017, 18, 45–54. <https://doi.org/10.1016/J.COCHE.2017.09.003>.
3. Zanchetta, A.; **dos Santos, A. C. F.**; Ximenes, E.; da Costa Carreira Nunes, C.; Boscolo, M.; Gomes, E.; Ladisch, M. R. Temperature Dependent Cellulase Adsorption on Lignin from Sugarcane Bagasse. *Bioresour. Technol.* 2018, 252, 143–149. <https://doi.org/10.1016/J.BIORTECH.2017.12.061>.
4. Ladeira Ázar, R. I. S.; Morgan, T.; **dos Santos, A. C. F.**; de Aquino Ximenes, E.; Ladisch, M. R.; Guimarães, V. M. Deactivation and Activation of Lignocellulose Degrading Enzymes in the Presence of Laccase. *Enzyme Microb. Technol.* 2018, 109, 25–30. <https://doi.org/10.1016/J.ENZMICTEC.2017.09.007>.

## PRESENTATIONS

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**Accepted Presentation:** “Kinetic Modelling of Lignocellulose Hydrolysis at High Solids Loading”, **A.C.F. dos Santos**, J.C. Overton, R. Szeto, K.A. Erk, E. Ximenes, N.S. Mosier, M.R. Ladisch. 2019 AIChE Annual Meeting, Orlando, FL, 11/2019.

**Accepted Presentation:** “Modulation of Lignin Inhibition on Lignocellulose Hydrolysis”, **A.C.F. dos Santos**, E. Ximenes, N.S. Mosier, M.R. Ladisch. 2019 AIChE Annual Meeting, Orlando, FL, 11/2019.

**Accepted Poster:** “Cellulase Adsorption on Sugarcane Bagasse Lignin at 30 and 45°C”, **A.C.F. dos Santos**, A. Zanchetta, E. Ximenes, C.C.C. Nunes, M. Boscolo, M.R. Ladisch. 2019 AIChE Annual Meeting, Orlando, FL, 11/2019.

**Invited Presentation:** “Effect of mixing on enzymatic hydrolysis of corn stover at high solids loading”, **A.C.F. dos Santos**, E. Ximenes, J. Dooley, D.N. Thompson, A.E. Ray, M.R. Ladisch. 40<sup>th</sup> Symposium on Biotechnology for Fuels & Chemicals, Clearwater, FL, 05/2018.

**Poster:** “Adsorption Of Non- And Purified Cellulolytic On Lignin At Different Temperatures”, A. Zanchetta, **A.C.F. dos Santos**, E. Ximenes, C.C.C. Nunes, M. Boscolo, E. Gomes, M.R. Ladisch. 39<sup>th</sup> Symposium on Biotechnology for Fuels & Chemicals, San Francisco, CA, 5/2017.

**Poster:** “Protein Enhanced Hydrolysis of Sugar Cane Bagasse”, **A.C.F. dos Santos**, E. Ximenes, M.R. Ladisch. 39<sup>th</sup> Symposium on Biotechnology for Fuels & Chemicals, San Francisco, CA, 5/2017.

**Presentation:** “Temperature Dependent Cellulase Adsorption on Lignin”, **A.C.F. dos Santos**, A. Zanchetta, M.R. Ladisch. 2017 ABE Graduate Industrial Research Symposium, Purdue University, West Lafayette, IN, 2/2017.

**Poster:** “Effect of Lignin on Cellulase Activity”, A.C.F. dos Santos, E. Ximenes, M.R. Ladisch. Purdue Corn Showcase, Purdue University, West Lafayette, IN, 7/2016.

**Poster:** “Effect of Lignin on Cellulase Activity”, A.C.F. dos Santos, E. Ximenes, M.R. Ladisch. 2016 ABE Graduate Industrial Research Symposium, Purdue University, West Lafayette, IN, 2/2016.

**Presentation:** “Effect of Lignin on Cellulase Activity”, A.C.F. dos Santos, E. Ximenes, M.R. Ladisch. 2016 ABE Graduate Industrial Research Symposium, Purdue University, West Lafayette, IN, 2/2016.

## RESEARCH FUNDING/ GRANTS AWARDED

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M.R. Ladisch, C. Wassgren, P. Sharma, N.S. Mosier, A. Ardekani, E. Ximenes, M. Gonzalez, A.C.F. dos Santos, A. Engelberth, K. Ambrose, K.A. Erk (Purdue University); D. Thompson, J. Aston (Idaho National Laboratory); P.T. Benavides (Argonne National Laboratory); J. Dooley (Forest Concepts); D. Monceaux (AdvanceBio Systems). Modeling Feedstock Performance and Conversion Operations.

US Department of Energy, 2019, \$1,378,384, 2 years.

Role: Research Associate, Bioprocess Engineer

A.C.F. dos Santos. Production of Bioproducts from Renewable Resources at Industrial Scale.

Brazilian Ministry of Education, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, Brasília, Brazil. 2014, Full Doctorate Scholarship, 4 years.

## PROFESSIONAL EXPERIENCE

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### Medical Affairs Analyst, Merck Sharp & Dohme

9/2013 – 7/2014

São Paulo, Brazil

- Answer physicians' question about MSD vaccines portfolio
- Develop visual aids, to be used in personnel training, and marketing campaigns
- Search scientific literature for information on MSD vaccines

### Regulatory Affairs Intern, Oxiteno

5/2013 – 8/2013

São Paulo, Brazil

- Material Safety Data Sheets (MSDS) elaboration
- Analysis of products classification based on GHS (Global Harmonized System of Classification and Labeling of Chemicals)
- Literature search of products' toxicity, ecotoxicity, and regulatory standing
- Elaboration of documents in three languages: Portuguese, English and Spanish

### Pharmacovigilance Intern, University of São Paulo Hospital

1/2013 – 4/2013

São Paulo, Brazil

- Active search of adverse experiences in in-patients
- Determination of casualty of adverse events
- Notify regulatory authorities of adverse events

### R & D Intern, Institute of Technological Research

2/2010 – 2/2012

São Paulo, Brazil

- Bibliographic research.
- Image analysis of microorganisms.
- Development of recombinant Escherichia coli.
- Identification of novel polyhydroxyalkanoates producing microorganisms.
- Development of biotechnological processes.

## HONORS & AWARDS

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**Debate Winner** 9/2017  
2017 Ecological Sciences and Engineering Symposium, Purdue University, West Lafayette, IN  
Topic: Climate change policy; 4 competing teams of graduate students

**Scholarship Award** 2/2017  
22nd Annual National Ethanol Conference, San Diego, CA  
One of six scholarships awarded, registrations and fees waived.

## SERVICE & LEADERSHIP ACTIVITIES

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**Postdoc Mentoring Award Reviewer** Spring 2019  
Office of Postdoctoral Studies, Purdue University

**Ask a Postdoc Panelist** Spring 2019  
Office of Postdoctoral Studies, Purdue University

**Safety Committee Member** 2016 – 2019  
Laboratory of Renewable Resources Engineering, Purdue University

**Bioenergy Session Chair** 2017 – 2018  
ABE Graduate Industrial Research Symposium, Purdue University

**Poster Session Chair** 2016 – 2017  
ABE Graduate Industrial Research Symposium, Purdue University

**Member** 2017 – Present  
Alpha Epsilon, The Honor Society of Agricultural, Biological & Food Engineering, Purdue University

## OUTREACH & EXTENSION

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**Volunteer Judge** 3/2018, 3/2019  
Lafayette Regional Science & Engineering Fair, West Lafayette, IN

**Volunteer Judge** 2/2019, 2/2020  
ABE Graduate Industrial Research Symposium, Purdue University