L. N. Samuelsson

Who am I?

Background

My research

Project development Collaboration opportunities

Summary

Biomass Pyrolysis Kinetics and Chemistry

L. N. Samuelsson

Department of Chemical Engineering, KTH

Kick-off for the Baltic Sea Research Programme 11-12 of June, 2013

◆□▶ ◆□▶ ★□▶ ★□▶ □ のQ@

L. N. Samuelsson

Outline

▲ロト ▲冊ト ▲ヨト ▲ヨト ヨー わえぐ

Who am I?

Background

My research

Project development Collaboration opportunities

Summary

1 Who am 1? Background

2 My research

L. N. Samuelsson

Outline

▲ロト ▲冊ト ▲ヨト ▲ヨト ヨー わえぐ

Who am I?

Background

My research

Project development Collaboration opportunities

Summary

1 Who am 1? Background

2 My research

L. N. Samuelsson

Education & Interests

◆□▶ ◆□▶ ★□▶ ★□▶ □ のQ@

Who am I?

Background

My research

Project development Collaboration opportunities

Summary

- Ph.D student since January 2012
- Master of science in chemistry and chemical engineering, KTH
- Studied French and Chinese
- Snorkeling, sci-fi, computer games

L. N. Samuelsson

Outline

▲ロト ▲冊ト ▲ヨト ▲ヨト ヨー わえぐ

Who am !? Background

My research

Project development Collaboration opportunities

Summary

 Who am I? Background

My research

L. N. Samuelsson

Who am 1?

Background

My research

Project development Collaboration opportunities

Summary

From biomass pretreatment to kinetics

Initially: Torrefaction as pretreatment for biomass gasification

• Solve feeding issues (coal vs biomass properties)

Literature survey on torrefaction —> Experimental results but lack of fundamental understanding

Then: Torrefaction chemistry and kinetics

literature survey on torrefaction kinetics —> Biomass too complex!

Current: Cellulose pyrolysis kinetics

L. N. Samuelsson

Who am |? Background

Mv research

Project development Collaboration opportunities

Summary

From biomass pretreatment to kinetics

- Initially: Torrefaction as pretreatment for biomass gasification
 - Solve feeding issues (coal vs biomass properties)

・ロト ・ 日 ・ ・ 日 ・ ・ 日 ・ ・ つ へ ()

Literature survey on torrefaction —> Experimental results but lack of fundamental understanding

Then: Torrefaction chemistry and kinetics

literature survey on torrefaction kinetics —> Biomass too complex!

Current: Cellulose pyrolysis kinetics

L. N. Samuelsson

Who am |? Background

Mv research

Project development Collaboration opportunities

Summary

From biomass pretreatment to kinetics

Initially: Torrefaction as pretreatment for biomass gasification

• Solve feeding issues (coal vs biomass properties)

Literature survey on torrefaction —> Experimental results but lack of fundamental understanding

Then: Torrefaction chemistry and kinetics

literature survey on torrefaction kinetics —> Biomass too complex!

Current: Cellulose pyrolysis kinetics

L. N. Samuelsson

Who am 1? Background

My research

Project development Collaboration opportunities

Summary

Aim: Investigate whether cellulose pyrolysis can be described as a first order, single step reaction Approach:

- Cellulose as substrate
- Thermogravimetric analysis (TGA)
- Extract apparent kinetic constants by using model-free methods

Limitations: No evolved gas analysis yet

Improvement: What other experimental methods could be used to verify the results from TGA?

First article

L. N. Samuelsson

Outline

▲ロト ▲冊ト ▲ヨト ▲ヨト ヨー わえぐ

Who am !? Background

My research

Project development Collaboration opport unities

Summary

 Who am I? Background

2 My research

L. N. Samuelsson

Who am 1?

Background

My research

Project development Collaboration opportunities

Summary

I want to learn more about / need more knowledge about:

- Thermal analysis
- Thermodynamics of solid state decomposition
- Organic chemistry and wood chemistry
- Experimental methods such as XRD, MS and SsNMR
- Numerical analysis of e.g. differential equations
- Python programming

Discussions!

Wish list...

◆□▶ ◆□▶ ★□▶ ★□▶ □ のQ@

L. N. Samuelsson

Summary

▲ロト ▲冊ト ▲ヨト ▲ヨト ヨー わえぐ

Who am 1?

Background

My research

Project development Collaboration opportunities

Summary

- My first article focuses on the apparent pyrolysis kinetics of cellulose
- I look forward to collaborating and discussing science with you!