1. INTRODUCTION AND AIM

There are several green processes, such as hydrothermal fractionation (HTF) or SCF extraction (SCFE), to upgrade biomass and a great deal of studies about them can be found in literature. However, a comprehensive study focused on what they can be involved in a biorefinery, also providing a useful tool for scale up.

2. METHODOLOGY

- Literature research:
  - Previous models
  - Kinetics
  - Experimental behaviour
- Model development and resolution:
  - Mass & energy balances
  - Discretization
  - Resolution and optimization
- Data fitting:
  - Parameter analysis
  - Process simulation
- Final degree Project: properties calculator in Android

3. RESULTS

- TGA analysis (oxidant and inert atmosphere)
- >15 different samples fitted (deviation < 10%)
- Composition and structure role
- Composition estimation tool
- Catalytic metal effect on hydrogen production

- Seeds and coffee beans extraction
- Solubility and mass transfer effects (external and internal)
- New model based on biomass characteristic extraction times
- Fitting deviation <10%
- Free fitting tool developed

- Biomass cellulosic fraction extraction
- Subcritical and supercritical water effect
- Lignocellulosic samples (holm oak and eucalyptus)
- Effect on fractionation of temperature, volumetric flow
- New kinetic model based on biomass solubility and sugar formation (deacetylation also included)
- New poblational model including structure and molecular weight role
- Fitting deviation <20%
- Free fitting tool developed
- Solid simulation agrees with literature sources (oligomers, glycerol, acetic acid releasing, sugar oligomer ratio)

4. ACADEMIC ACTIVITIES

**Academic courses**
- "Solid state hydrogen storage: an overview" given by professor Chiara Milanese from University of Pavia, Italy
- Winesense spring school: “Process intensification and product development: a focus on grape polyphenols”
- "Bioproducts Engineering and Biorefineries" given by professor Rafa Luque from University of Granada, Spain
- "Web of Science advanced seminar" given by Cristina González Copeiro del Villar, University of Valladolid, Spain
- "SciFinder seminar" given by the library of the University of Valladolid, Spain

**International congresses**
- ECCE10 + ECAB3 + EPIC5 2015 short communication
- IV Beroamerican Conference on Supercritical Fluids, ProSciCa: poster
- 12th conference on Renewable Resources and Biorefineries: poster
- 2nd International Conference on Green Chemistry and Sustainable Engineering: short communication
- 11th conference on Renewable Resources and Biorefineries: poster
- 10th conference on Renewable Resources and Biorefineries: short communication
- IV Beroamerican Conference on Supercritical Fluids, ProSciCa: poster
- 12th conference on Renewable Resources and Biorefineries: poster
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- 11th conference on Renewable Resources and Biorefineries: poster
- 10th conference on Renewable Resources and Biorefineries: short communication

5. FUTURE WORK

- Testing the HTF model with more samples, like catalpa, linseed etc. Time requirements: 2 months · t\textsubscript{samples} ~ 6 months (December 2016 – June 2017)
- Validating the HTF model in bigger reactors. Time requirements: 2 – 3 months (May 2017 – July 2017)
- Developing a kinetic for lignin depolymerisation with supercritical water. Time requirements: 4 – 6 months (September 2017 – February 2018)

6. INTERNATIONAL STAGE

- International stage at University of Hamburg (May 2017 – July 2017)
- HTF reactor: 40 L
- Post-treatment: enzymatic hydrolysis

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