



PROGRAMAS E BIBLIOGRAFIAS / PÓS-GRADUAÇÃO

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| CÓD. DISCIPLINA | NOME COMPLETO DA DISCIPLINA |
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| BI006 | Advanced Topics in Biorefineries - Biomass, Bioenergy and Biorefinery |

OBJETIVOS:

Transmit the basic knowledge of biomass chemical and physicochemical properties and its influence on the conversion process. The discipline is focused on the fundamental aspects of biomass chemical composition, cellulose, hemicellulose, lignin, extractives and minor constituents. Structure and plant cell wall organization. Plant species composition diversity, heterogeneity and tissue organization. Plant cell wall components reaction in acid and alkaline medium. Physicochemical properties: cellulose crystallinity and degree of polymerization, accessibility and porosity. Pretreatments effect on the biomass composition and physicochemical properties.

The bioenergy production using chemical and biotechnological route needs to overcome the lignocellulosic material recalcitrance. The recalcitrance is influenced by the chemical and physicochemical properties of the lignocellulosic biomass. These properties are responsible to the challenge of the material conversion to bioenergy, and the needed pretreatment to possibility hydrolytic enzymes action and fermentable sugars release. The pretreatments are influenced by the material chemical composition and properties, which is necessary to be understood for an efficient plant cell wall deconstruction for bioenergy production. Moreover, the professionals in bioenergy field should understand basic concepts of biomass characteristics such as chemical composition, physicochemical properties and material recalcitrance.

PROGRAMA:

- 1) Overview of plant cell wall structure and organization;
- 2) Major components: cellulose;
- 3) Major components: hemicellulose;
- 4) Major components: lignin;
- 5) Minor components: extractives, ash and other polysaccharides;
- 6) Components reaction in acid medium: polysaccharides;
- 7) Components reaction in acid medium: lignin;
- 8) Components reaction in alkaline medium: polysaccharides;
- 9) Components reaction in alkaline medium: lignin;
- 10) Physicochemical properties of biomass/cellulose: crystallinity and degree of polymerization;
- 11) Physicochemical properties of biomass/cellulose: porosity and accessibility;
- 12) Influence of the composition and physicochemical properties in the enzymatic hydrolysis;
- 13) Methods for chemical composition determination;
- 14) Methods for physicochemical properties determination;

EMISSÃO: 1 de dezembro de 2021

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15) Current pretreatments and its effect on the chemical composition and physicochemical properties of biomass;

AVALIAÇÃO:

Presentation of seminars and case study

BIBLIOGRAFIA:

- Fengel D, Wegener G. 1984. Wood: chemistry, ultrastructure, reactions, Berlin, New York.
- Himmel M. 2008. Biomass Recalcitrance: Deconstructing the Plant Cell Wall for Bioenergy. Wiley-Blackwell.
- Sugarcane: Production, Consumption and Agricultural Management Systems. 1 ed.: Nova Science Publishers, p. 1-33, 2014.
- Latest articles of scientific literature on biomass physicochemical properties (It will be provided when the subject is offered).