Characterization of Oil Palm Biomass, Derived Materials, and Applications



Autores

Heidi Teran, Diana Giraldo, Gabriel Chiappo, Maria del Pilar Noriega, Farid Chejne Janna

Sinopsis

The aim of this case study is to identify the value added of existent biomass fibers (i.e., agro-industrial byproducts) and potential blends. The purpose is to explain the facts about sustainable and/or organic oil palm biomass in the energy recovery sector and in the biobased materials industry. Demand for sustainable biobased materials and energy recovery from biomass triggered the rapid growth experienced by the agricultural industry over recent years, leading to concerns about its impact on the environment and ecosystem. The agricultural industry is currently making efforts to improve sustainability practices, certifications, and to reduce carbon emissions based on innovative technologies. The used biomass, i.e. palm kernel shells (PKS), empty fruit bunches (EFB), and mesocarp fibers (MF), possesses widely accepted sustainability certifications for oil palm biomass, such as the Control Union certifications as a Roundtable on Sustainable Palm Oil (RSPO) approved certification body, the Regenerative Organic certification (ROC) for farms and products that meet the highest standards for soil health and biomass, and the EU Organic Certification in compliance with the standards and regulations of EC No.

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834/2007 and EC No. 889/2008 on organic production of agricultural products. This work presents the main physicochemical characteristics of this studied biomass relevant to its energy recovery and a biobased material application. The characteristics of oil palm biomass can be summarized as a feedstock of medium energy content compared to fossil fuels and lower levels of sulfur, chlorine, and nitrogen than coal. Pellets of oil palm biomass are proven to meet expectations in both quality class A and B of non-woody pellets, i.e., characterized using the standards of solid biofuels, part 6, non-woody pellets, ISO 17225:2021. The application of biobased material ranges from pulp and paper to biobased polymer materials.

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Sobre el autor

Heidi Teran

DG

Diana Giraldo

GC

Gabriel Chiappo

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MP

Maria del Pilar Noriega

FC

Farid Chejne Janna

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