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Production of infra-structure ready biofuels from olive mill wastewater sludge

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Olive oil production is a major industry in the Mediterranean countries such as Tunisia, Spain, Italy, Greece, and Turkey. Together, these countries produce about 90% of the world olive oil. Olive oil production generates olive mill waste water which contains phenolics, sugars and other substances that have to be disposed. The current disposal system in Tunisia for example consists of solar evaporation of the water and land filling of the solid sludge. We investigated the catalytic pyrolysis of the olive mill wastewater sludge (OMWS) in a fluidized bed system using HZSM-5 and other catalysts and compared them with pyrolysis using sand as the pyrolysis medium. The pyrolysis with sand generated very viscous liquids which were almost paste-like at room temperature, but when either the HZSM-5 or other catalysts were used as the fluidized bed catalytic pyrolysis medium, very low viscosity liquids (6 cP @40 C) were produced and the higher heating value (HHV) was as high as 42 MJ/kg and the oxygen content of the oil was less than 5 wt%. The oil formed two phases with the aqueous fraction and the pH was neutral. The gas chromatographic/mass spectrometric analysis and ¹³C NMR analysis of the oils showed that whereas the pyrolysis of OMWS on sand produced a large number of long chain fatty acid products, the catalytic pyrolysis oils consisted of mostly ketones, esters, and alcohols with very little fatty acid groups. The properties of the catalytic pyrolysis oils showed that it could qualify as a green diesel fuel or it could be readily hydrogenated to improve its properties further as an infrastructure ready biofuel for either transportation or heating fuel. This technology provides a potential solution for waste disposal in olive oil industry while simultaneously generating fuel and can also serve as vehicle for greenhouse gas reduction.

Biography

Foster Agblevor is currently the Utah Science Technology and Research (USTAR) endowed Professor of Biological Engineering at Utah State University (USU), Logan UT and Director of USTAR Bioenergy Center, Utah State University. He is also Adjunct Professor of Biological Systems Engineering, Virginia Tech, Blacksburg, VA. He received PhD in Chemical Engineering and Applied Chemistry from the University of Toronto. He did Postdoctoral work at the Hawaii Natural Energy Institute, University of Hawaii, Manoa Campus, Honolulu, HI.

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