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Removal effect of alkali and alkaline earth metallic species and ash from biomass (palm empty fruit bunch) on pyrolytic characteristics to produce oil

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In the palm oil industry, the palm fresh fruit bunch (FFB) is used to make crude palm oil. During the oil manufacturing process, the palm empty fruit bunch (EFB), which accounts more than 20 wt. % of the FFB, is generated as a byproduct. Hence, if a robust conversion method is found, the EFB will be an appealing renewable energy source. In this study, the fast pyrolysis of the EFB was conducted in a lab-scale (throughput = 1 kg/hr) bubbling fluidized bed reactor at the temperatures ranged from 400 to 650°C. However, one of the most difficult problems in manufacturing homogeneous bio-crude oil from EFB was found to be its high ash content. Also, alkali and alkaline earth metallic species (AAEM) in EFB affect to reduce quality of bio-crude oil. Thus, in this study, the EFB was washed by water (both tap water and distilled water) and nitric acid (0.1 wt. %) with different total washing times. After washing, ash content was decreased from 5.9 wt. % to 1.53 wt. % using all of the washing treatments, and the AAEM was removed over 80 wt. % of total AAEM, such as potassium, magnesium, calcium and sodium. For considering economic and efficiency, treated EFBs, by tap water (for 1 days) and nitric acid (for 2 days) were chosen and been used to experiments. The fast pyrolysis experiments were carried out using treated EFBs variably. Consequently, the highest yield showed 48 wt. % at approximately 500°C, when used only treated EFB by tap water. However, for confirming the characteristic changes, the bio-crude oils were analyzed GC-MS, elemental analysis and homogeneity by digital microscope.

Biography

Prof. Yong-Chil Seo is Former President of Korea Waste Management Society. As a professor of Yonsei University he is now directing two national programs to support graduate student research and fellowship in the fields of "Waste to Energy and Environmental Engineering". His major research areas are Waste and Biomass to Energy, Waste Recycling and Air Pollution Controls, especially Heavy Metals including Mercury. He has been working as an expert working group member for UNEP to develop the implementation guidance of Minamata Mercury Convention last several years.

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