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Graphitization of empty fruit bunch (EFB) waste at lower heating temperature

Abstract

Previously, synthetic graphite was produced at higher heating temperature, which is above 2500°C in complex processing method and by using petroleum coke, anthracite, and coal tar pitch as the starting materials. These materials are known as non-waste sources. Therefore, in this study, Empty Fruit Bunch Waste (EFB) has been identified as a potential carbon source from waste to replace the non-waste sources of starting materials for synthetic graphite production. Hence, by implementing a controlled heating condition via pyrolysis process, with fixed heating rate and soaking time, Empty Fruit Bunch Waste (EFB), was heated at 3 different series of heating temperatures, which are, 300°C, 400°C and 500°C. The heating rate applied was maintained at 10°/min and the soaking time used 3 hours. After the heating treatment, the synthetic graphite obtained was characterized by various analytical tools, including, X-Ray Diffraction (XRD) analysis, Scanning Electron Microscope (SEM) analysis, and Fourier Transform Infra-Red (FTIR) Analysis. Based on the analysis, it was confirmed that synthetic graphite was successfully synthesized by heat treatment at 500 °C with 10°/min of heating rate and 3 hours soaking time. Synthetic graphite was observed in the form of amorphous carbon based on the XRD diffraction pattern that matches with the reference code of 00-041-1487.