Study on Ultimate Properties and Crystallinity Index of Torrefied Biochar from Oil Palm Empty Fruit Bunch

ABSTRACT

This study was conducted to characterize the elemental properties and crystallinity index of the torrefied oil palm empty fruit bunch (OPEFB) biochar from torrefaction process via furnace intended for being as an alternative renewable energy sources. The influence of three major torrefaction parameters namely particle size, holding temperature and residence time was investigated. Characterization of torrefied OPEFB biochar had been done by elemental analyser and X-ray diffraction (XRD) for ultimate properties and crystallinity index respectively. The carbon element in the torrefied OPEFB biochar was increased when the holding temperature and residence time increased while oxygen element amount is decreasing. This is due to decomposition of hemicellulose occurred in this region. For crystallinity index (CrI) by XRD, there was decreasing pattern occurred as the holding temperature and residence time increased from 200–300°C and 30-90 minutes respectively. This shows that the torrefied OPEFB biochar's cellulose crystallinity is reduced as the cellulose become completely amorphous.