

Degradation and physical properties of sugar palm starch/ sugar palm nanofibrillated cellulose bionanocomposite

ABSTRACT

This paper aims to study the degradation rate of sugar palm nanofibrillated cellulose (SPNFCs) and sugar palm starch (SPS). SPNFCs were isolated from sugar palm fiber, while SPS is extracted from sugar palm trunk. The SPNFCs were reinforced with SPS biopolymer as biodegradable reinforcement materials of different diameter/length based on the number of passes of high pressurize homogenization process (5, 10 and 15 passes represented by SPS/SPNFCs-5, SPS/SPNFCs-10, and SPS/SPNFCs-15). These SPNFCs were incorporated into SPS plasticized with glycerol and sorbitol via solution casting method. Soil burial experiment performed on SPS and SPS/SPNFCs bionanocomposites showed that SPS was degraded more rapidly by losing 85.76% of its mass in 9 days compared to 69.89% by SPS/SPNFCs-15 bionanocomposite. The high compatibility between SPNFCs nanofiber and SPS biopolymer matrices can be observed through field emission scanning electron microscopy (FE-SEM).

Keyword: Sugar palm; High pressurized homogenizer; Nanofibrillated cellulose; Nanocomposites; Soil burial degradation