

Properties and characteristics of nanocrystalline cellulose isolated from olive fiber

ABSTRACT

Olive fiber is a sustainable material as well as alternative biomass for extraction of nanocrystalline cellulose (NCC), which has been widely applied in various industries. In the present study, ONC-I, ONC-II, and ONC-III were extracted from olive stem fiber at different hydrolysis reaction times of 30 min, 45 min, and 60 min, respectively. The nanoparticle size was found gradually reducing from ONC-I (11.35 nm width, 168.28 nm length) to ONC-III (6.92 nm width, 124.16 nm length) due to the disintegration of cellulose fibrils. ONC-II and ONC-III possessed highly pure cellulose compartments and enhanced crystals structure. This study also showed that rigidity increased from ONC-I to ONC-II. ONC-III showed the highest crystallinity of 83.1 %, endowing it as a potentially reliable load-bearing agent. Moreover, ONC-III exhibited highest stable heat resistance among the chemically-isolated nanocellulose. We concluded that olive NCC could be promising materials for a variety of industrial applications in various fields.

Keyword: Olive fiber; Nanocrystalline cellulose; Morphological properties; Physicochemical properties; Thermal properties