

Wettability Properties of Pineapple Leaf Fibers and Banana Pseudostem Fibers Treated by Cold Plasma

Authors : Tatiana Franco, Hugo A. Estupinan

Abstract : Banana pseudostem fiber (BPF) and pineapple leaf fiber (PLF) for their excellent mechanical properties and biodegradability characteristics arouse interest in different areas of research. In tropical regions, where the banana pseudostem and the pineapple leaf are transformed into hard-to-handle solid waste, they can be low-cost raw material and environmentally sustainable in research for composite materials. In terms of functionality of this type of fiber, an open structure would allow the adsorption and retention of organic, inorganic and metallic species. In general, natural fibers have closed structures on their surface with intricate internal arrangements that can be used for the solution of environmental problems and other technological uses, however it is not possible to access their internal structure and sublayers, exposing the fibers in the natural state. An alternative method to chemical and enzymatic treatment are the processes with the plasma treatments, which are known to be clean, economical and controlled. In this type of treatment, a gas contained in a reactor in the form of plasma acts on the fiber generating changes in its structure, morphology and topography. This work compares the effects on fibers of PLF and BPF treated with cold argon plasma, alternating time and current. These fibers are grown in the regions of Antioquia-Colombia. The morphological, compositional and wettability properties of the fibers were analyzed by Raman microscopy, contact angle measurements, scanning electron microscopy (SEM) and atomic force microscopy analysis (AFM). The treatment with cold plasma on PLF and BPF allowed increasing its wettability, the topography and the microstructural relationship between lignin and cellulose.

Keywords : cold plasma, contact angle, natural fibers, Raman, SEM, wettability

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