

Structural Analysis, Order Molecular and Composition of the *Bambou Angustifolia Kunt* bi-colour variety

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Abstract. Bamboo known as *Guadua Angustifolia Kunt* variety bi-colour (GAK-VB), was studied with the techniques X-rays diffraction (XRD), thermogravimetry (TGA), differential scanning calorimetric (DSC), and microscopy Raman (μ -Raman) the cross section at the height of the internodes. The diffractograms XRD identified the crystalline of the structure showing directions along (200) triclinic I_{β} and monoclinic (110) I_{α} type of cellulose. The termograms TGA and DSC showed phase transitions about the 119, 333 and 536°C, respectively. These phase transitions are associated with processes of dehydration, radicals formation, carbonyl, carboxyl groups, and decomposition of the material. The Raman spectrum showed the presence of molecular systems associated with hemicelluloses, cellulose (links carbon-carbon, carbon hydroxides, etc.) and lignin. The other hand, the position of the bands shows a slight shift with respect to the depth.

In this paper, we study structural properties, thermodynamic and molecular order with; XRD, TGA, DSC y μ -Raman depending on depth and temperature in the section of the internodes outer surface, 4 mm, 10mm and inner surface, for a temperature range between 22 and 600°C.

The Figure 1 shows a monoclinic system in the direction (110) and in order triclinic (200) associated with cellulose I_{α} , I_{β} , respectively. The respective positions of the peaks do not change with depth and temperature while the intensity varies with depth [1]. Figure 2 shows the evolution of phases depending on temperature for the section measured 10 mm from the surface. The first transition ($T=119^{\circ}\text{C}$) is associated with dehydration, the second transition ($T=333^{\circ}\text{C}$) is associated with the formation of free radicals, carbonyl, carboxyl groups, and the third transition ($T=536^{\circ}\text{C}$) is associated with the decomposition of the material, consistent with reports [2]. Figure 3 shows a μ -Raman spectrum in the range 400 to 1650 cm^{-1} at room temperature, the positions of the bands indicate the presence cellulose, located around 555, y 835 cm^{-1} and lignin around 1603 cm^{-1} , respectively[3].

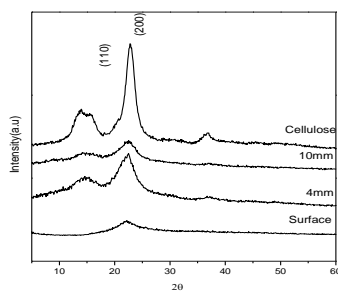


Figure 1: XRD of GAK-VB at room temperature

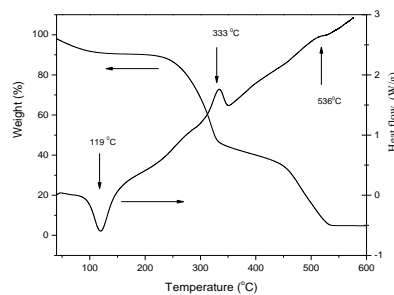


Figure 2: TGA and DSC thermograms of GAK-VB to 10.0 mm from the surface

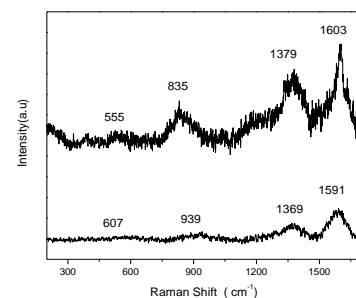


Figure 3: μ -Raman at room temperature for two of depths

Referencias

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