

## Cellulose Nanowhiskers obtained from Sugarcane Bagasse: Influence of the Hydrolyze Process in the Nanowhiskers Size and Suspension Stability.

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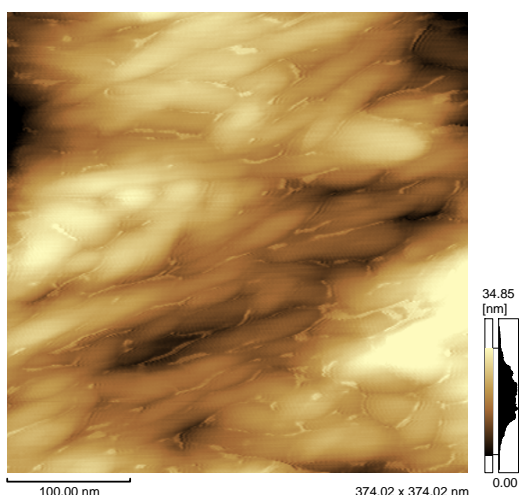
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**Abstract** – Cellulose nanowhiskers were synthesized from the cellulose extracted of the sugarcane bagasse using two different methodologies with high hydrolyze time, 4 hours. In the present work was analyzed the influence of the different inorganic acid in the size and suspension stability of cellulose nanowhiskers. The nanowhiskers obtained from sulfuric acid process were smaller than the nanowhiskers from the hydrochloric acid process. In addition, the surface properties of the nanowhiskers also depend on the hydrolyze process. Cellulose nanowhiskers obtained from hydrochloric acid process agglomerated easily, indicating a high density of hydroxyl groups on the whiskers surface.

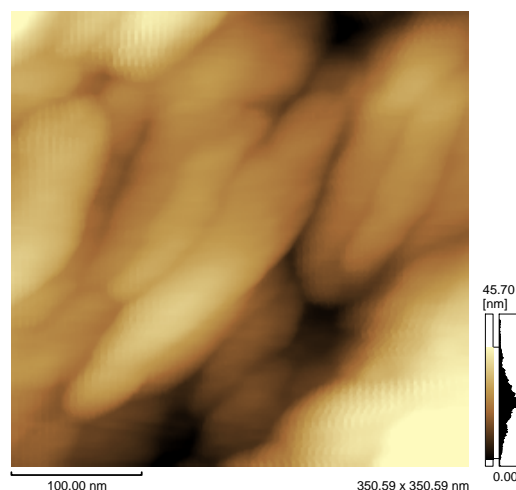
Cellulose nanowhiskers are a promising alternative of biomass utilization in the biocomposites productions.<sup>1</sup> Composites prepared using cellulose nanowhiskers, as reinforced phase, have demonstrated a outstanding increase in the mechanical properties due the interfacial interaction between the polymeric matrix and the nanowhiskers.<sup>2,3</sup> The influence of cellulose nanowhiskers in the performance of composites is directly linked to the size of the nanofibers and to the surface characteristic of the crystal. The structure and properties, especially the size of the nanowhiskers, depend on the source of the original cellulose materials, but the preparation process has also an important aspect in the final characteristic of the material.<sup>4</sup>

Cellulose nanowhiskers can be obtained by the acid hydrolyses of cellulose fibers. In the present work was presented a study of the cellulose nanowhiskers formation from the cellulose extracted of the sugarcane using two different methodologies. In these methodologies were used concentrated solutions of hydrochloric acid (30%) or sulfuric acid (60 %) with high hydrolyze time (4 h). After the hydrolyze process the mixture was washed by successive centrifugations with deionized water until neutrality was achieved.

The stability of the suspensions of cellulose nanowhiskers prepared by the two processes was exceptionally distinct. The suspension of cellulose nanowhiskers obtained from hydrochloric acid hydrolyze was much less stable than was the suspension of cellulose nanowhiskers obtained from hydrochloric acid hydrolyze. The agglomeration of the nanowhiskers from HCl process occurs in few minutes, whereas the suspension of cellulose nanowhiskers from H<sub>2</sub>SO<sub>4</sub> process was maintained stable during some days. In the Figures 1 and 2 can be observed that the size of the cellulose nanowhiskers obtained by the two methods was different. The cellulose nanowhiskers from H<sub>2</sub>SO<sub>4</sub> process were smaller than the material obtained from the HCl process.



**Figure 1:** AFM image of the cellulose nanowhiskers obtained from a sulfuric acid hydrolyze process.



**Figure 2:** AFM image of the cellulose nanowhiskers obtained from a hydrochloric acid hydrolyze process.

### References

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