Nanomechanical properties of enzymatically digested cotton-based nanocellulose.

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Abstract

During the last decades, cellulose-based materials have rapidly gained importance due to their abundance and sustainability [1]. By combining the growth of cotton in tissue culture with molecularly-designed glucose building-block feeding, modified cotton fibers with tailored properties can be obtained [2]. Our goal in this project is to study the nanomechanical properties of nanocellulose with modified wetting properties using environmental Atomic Force Microscopy (e-AFM). Figure 1 shows enzymatically digested (72 hours) cotton fibers without modification (control), measured using e-AFM. The results show single nanocellulose fibrils with lengths ranging between 500[nm]-1[μm] and diameter of ~10[nm]. Additional dynamic light scattering (DLS) experiments on the control sample indicates an optimum digestion time of 72hrs, supporting our e-AFM results (Fig. 2). Future experiments will focus on e-AFM measurements on single nanocellulose fibrils with modified wetting properties.

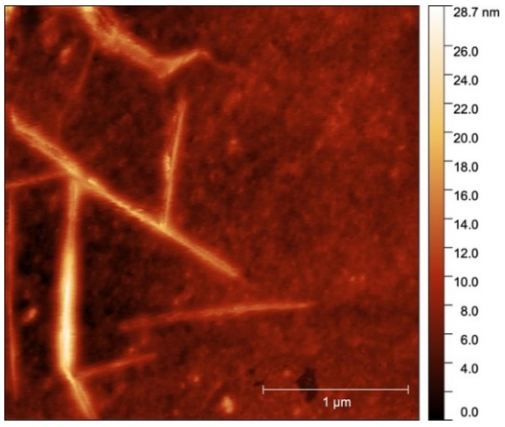

Figure 1: AFM topographical image of the sample with 72 hours of digestion and 1:500 dissolution, using a supersharp AFM cantilever (SSS-FMR).

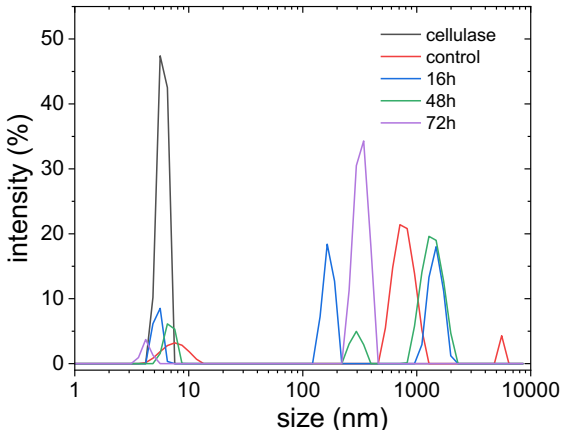

Figure 2: DLS measurements of the control sample.

Acknowledgments: DJP and TPC thank the project "Fondecyt Regular 1211901".

References

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