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A new quality index for benchmarking of different cellulose nanofibrils

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Highlights

- This study proposes a multi-criteria method to obtain the quality index of cellulose nanofibril suspensions under the form of a unique quantitative grade.
- According to this method, the influence of different parameters such as pulp conditioning, refining, and hemicellulose content on the defibrillation process is highlighted.
- The quality index method allows for the benchmarking of commercial nanocellulose products.
- This method has been implemented with widespread adaptability: In addition to the complete quality index, a simplified and faster version is also proposed.

Abstract From a single plant source, a wide range of mechanically-deconstructed cellulose nanomaterials can be obtained due to the large number of possible combinations of pre-treatments, mechanical disintegration process, and post-treatments. It leads to the existence of a variety of cellulose nanofibrils with different shapes, morphologies, and properties on the market. The resulting material is actually a complex mixture of nanoscale particles, microfibrillated fibers, and residual fibers on the millimeter scale. Defining a “degree of fibrillation” for determining the final cellulose nanofibril quality is a challenging issue. This study proposes a multi-criteria method to obtain the quality index of cellulose nanofibril suspensions under the form of a unique quantitative grade. According to this method, the influence of different parameters such as pulp conditioning, refining, and hemicellulose content on the defibrillation process is highlighted. This method also allows for the benchmarking of different commercial nanocellulose products.

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