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Development of a NanoHUB Tool: Mechanical Features of Crystalline Nano Cellulose

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ABSTRACT

In the past decade, many researchers have studied mechanical properties of polymer reinforced nanocomposites to understand and improve the performance of materials. In this research, we would develop a tool that would conduct a mechanical test on structures of a nanocomposite called Crystalline Nano Cellulose. Crystalline Nano Cellulose (CNC) is a strong and natural molecular structure that we could obtain from processing a regular cellulose cell we could obtain from ordinary plants through acid hydrolysis. The mechanical test on these structures of CNC would be able to provide information about the type of failure and the effect of length and arrangement of CNC structures on the mechanical properties. The main goal to the research is to evaluate the effect of CNC aspect ratio (length / width), the effect of angular distribution and the effect of microstructure on the mechanical properties. A tool would be built on nanoHUB that used Python as the programming language and Rappture as the GUI designer. The tool would accept user's desired molecule length, the variance of the length, angular alignment of the molecules and variance of the angle values. In addition, the tool would accept these parameters to produce a visualization of the structure specified, run a mechanical test on the structure and provide a graphical feedback. The results that could be expected from the tool is a visualization of both the initial structure and a video of the test on the structure. A series of feedback graph and data file of the test.

KEYWORDS

Crystalline Nano Cellulose, Structures, Mechanical features, nanoHUB, Rappture

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