

Nanocellulose and its use in composite processing

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Nanocellulose materials, including cellulose nanofibers and nanocrystals, have gained large interest during the last 10-15 years both in research society and in industry. These fascinating bionanomaterials, which can be isolated from wood, annual plants and many other biobased resources are interesting for packaging, medical, transportation and construction applications. Cellulose nanofibers and nanocrystals are very small, their diameter can be as small as 3 nm and the length can vary from hundreds of nanometers to micrometer. They own many interesting properties, such as high mechanical strength and stiffness, they are of lightweight, biodegradable, transparent and they can also self-organize to strong layered networks. These nanocellulose materials are separated from plant cell wall by using chemical, mechanical and processes combining these two processes and energy efficiency and high yield are of interest. This lecture is giving an insight to these nanomaterials and their processes as well as some ideas about how these materials can be used in composites and what type of properties can be achieved. Composites manufacturing processes such as liquid-assisted extrusion, in-situ polymerization and impregnation of nanofiber networks using different strategies will be discussed.