

Cellulose Nanofibers in Packaging: Markets, Applications and Opportunities

<https://marketpublishers.com/r/C1DAED6ACBCEN.html>

Date: January 2018

Pages: 165

Price: US\$ 850.00 (Single User License)

ID: C1DAED6ACBCEN

Abstracts

The bio-based and -active packaging market is growing due to the need for:

environmentally friendly products

improving food quality and safety during transportation.

replacing petroleum-based, glass, metal, wax/plastic coated products.

Consumer demand for more environmental friendly products has led to the development of nanocomposites derived from renewable sources with triggered biodegradability, but with the same mechanical properties as commonly used materials.

The global plastics sector currently produces approximately 250 million tons annually. Over 99% of this is derived from fossil fuels, and most of it is not biodegradable. Currently, the packaging materials are largely based on glass, aluminium and tin, and fossil derived synthetic plastics. These materials possess high strength and barrier properties. However, they are unsustainable, some are fragile such as glass, and their weight adds to energy costs for shipping.

Therefore, packaging recycling is of great importance, and this market is a potentially lucrative one for cellulose nanofibers (CNF/NFC), and is specifically targeted by most producers. CNF packaging demonstrate strength and stiffness close to that of polyolefines, and can be seen as a low cost “green” substitute for application in food packaging and conservation.

Bio-nanocomposites based on CNF are 100% fully biodegradable and are a prime candidate to replace petroleum-based packaging. Some of the shortcomings of biopolymers, such as weak mechanical and barrier properties can be significantly enhanced by the use of nanocellulose-based materials. CNF is being incorporated into transparent films with excellent barrier properties for application as potential replacement materials for PET plastics in food packaging.

The use of CNFs can potentially extend the food shelf life and can also improve the food quality as they can serve as carriers for a variety of active substances, such as anti-oxidants and anti-microbials.

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