

Nanocellulose: nano in size and giant in the potential to open up endless novel environment-friendly applications

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Abstract:

The term “nanocellulose” refers to cellulose materials having at least one dimension in the nanometer range. The three main types of nanocelluloses are cellulose nanofibers (CNF), cellulose nanocrystals (CNC), and bacterial cellulose (BC), that differ in their dimensions, properties, and preparation methods. The nanocellulose combines important cellulose properties such as high specific strength, modulus, and hydrophilicity with specific features of nanoscale materials. Nanocellulose applications are linked to their properties, which include lightweight, nontoxicity, high strength and modulus, dimensional stability, thermal stability, high thermal conductivity, high optical transparency, low oxygen permeability, modest abrasivity, and the fact that it is reusable, recyclable, environmentally friendly, and biodegradable.¹

Potential markets for nanocelluloses include high-volume processes like in pulp and paper, plastics, automotive, food industry, or building sectors (e.g., strength additives in nanocomposites, barrier/coating applications, food additives), as well as low-volume applications like in medicine, cosmetic, and pharmaceutical sectors (e.g., drug delivery, implants, additives).^{2,3} Moreover, there are some novel and emerging applications based on the electrical and photonic properties of nanocellulosic materials like organic LEDs, flexible electronics, photovoltaics, photonic films, and recyclable electronics.

This presentation will give an overview on nanocelluloses, including their production, their properties and several potential applications in different industrial sectors.

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References

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