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Water-borne Crosslinked Nanocellulose Coatings and Materials

Cross-linked nanocellulose coatings use a water-borne system to minimize volatile organic solvents, offering a sustainable, low-cost solution with increased hardness and water resistance for various protective applications.

Protective organic coatings for various products have been in use for the past several decades to enhance the mechanical, optical, and barrier properties of the underlying structure. Traditionally, coating systems have been based on volatile organic solvents (VOCs) used in the priming step, which has had inevitable adverse effects on the environment and human health. Researchers at Purdue University have developed coatings of cross-linked nanocellulose and its composites using water-borne crosslinking agents. Three main types of nanocelluloses (CNs) were tested: cellulose nanocrystals (CNCs), mechanically fibrillated cellulose nanofibrils (mCNFs or CNFs), and Tempo Oxidized Cellulose Nanofibrils (TOCNFs). As this technology employs a purely water-borne system, it minimizes the amount of VOCs used and is thus more sustainable while also keeping costs low. Furthermore, the cross-linked solutions demonstrated increased hardness and were more resistant to water when compared to non-cross-linked types of CNs.

Advantages:

- Sustainable

- Increased hardness

- More resistant to water

- Low cost

Potential Applications:

- Sustainable coatings or materials

TRL: 4

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Category

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Materials Science & Nanotechnology/Nanomaterials & Nanostructures

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