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Nanotechnology in the furniture industry: applications and future perspectives

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Abstract

Nanotechnology has the potential to significantly improve every industry, produce innovative materials and products, and revolutionize all areas of life. Many industries have benefited from the advantages of nanotechnology advances during the last 20 years. On the other hand, the furniture industry has recently embraced these works and begun to focus its research on this area. Nanotechnology makes it possible to make furniture lighter, more durable, waterproof and stainproof, antibacterial, antiviral, and less flammable. In the near future, nanotechnology could be used to develop smart furniture that can warm up in cold weather, become opaque against solar reflections, change color, measure basic body functions, and self-healing repair scratches and small damage. This review presents a comprehensive overview of nanotechnology applications in the furniture industry, as well as recent trends, advancements, and future perspectives.

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Introduction

Furniture is products that differ in terms of functional, aesthetic, design, and design and are generally obtained from wood materials and derivatives to meet people's social and cultural needs, such as working, resting, eating, and meeting safely and comfortably. Furniture is functional since it meets human needs and reflects the person who uses it with a design line.

The global furniture industry is growing in terms of production, imports, and exports. Furniture's future is now on a dynamic, aesthetic course, with personalized designs that prioritize people's wants, designs suitable for structures, ergonomics, functionality, and unique lines.

Furniture damage is triggered by biological factors such as insects and bacteria, environmental factors such as dust, sunshine, and humidity, and man-made factors such as soiling, fire, and breaking forces.

Fig. 1 shows some of the factors that cause furniture damage.

Fig. 1. Some of the factors that lead to furniture damage (Mahran, 2019)

Advancements in nanotechnology have benefited a wide range of industries during the last 20 years. In contrast, the furniture industry has only recently entered these works and begun to focus its research on this area. Using nanotechnology, materials can be improved and made stronger, lighter, and more durable.

This paper provides a brief overview of furniture industry applications of nanotechnology.

Nanoscience and Nanotechnology

The prefix "nano" refers to a Greek prefix that means dwarf or very small and represents one millionth of a meter (10^{-9} m). Nanoscience is the study of structures and molecules with nanometer sizes ranging from 1 to 100 nm, whereas nanotechnology is the implementation of these structures and molecules in practical applications such as devices (Mansoor and Fauzi Soelaiman, 2005).

Nanotechnology in The Furniture Industry

In the furniture and wood-based products industry, nanotechnology has great promise (Jasmani et al., 2020). Nanotechnology could lead to stronger, multifunctional, yet

lighter wood-based products (Bajpai, 2016). It is possible to use nanotechnology to produce furniture that is lighter, more durable, waterproof, stainproof, antibacterial, and antiviral, as well as less flammable. Nanotechnology can be used to create wood products that are more environmentally friendly and resistant to parasites and fungi. The improvement of wood's durability, resistance to water's tendency to swell it, and resistance to stress and strain are all made possible by nanotechnologies. Nanotechnology could soon be used to produce smart furniture that can measure fundamental bodily functions, warm up in cold weather, become opaque against solar reflections, change color, and self-heal scratches and minor damage.

Conclusions

Nanotechnology is one of the most promising technologies of the 21st century. Both locally and globally, nanotechnology can significantly improve and change the furniture industry's landscape. Nanotechnology could be used in the near future to build smart furniture that can warm up in cold weather, become opaque against sun reflections, change color, measure basic physiological functions, and self-heal scratches and minor damage.

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