Exploring the Industrial Applications of Graphene Derivatives: Focus on Construction and Textiles

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Abstract

Graphene and its derivatives, particularly graphene oxide (GO) and reduced graphene oxide (rGO), have garnered significant attention due to their extraordinary properties, such as high surface area, exceptional mechanical strength, and excellent electrical conductivity. These properties make graphene derivatives highly promising for a range of industrial applications. In particular, the construction and textile industries are exploring innovative uses of these materials to enhance performance and functionality.
In the construction sector, graphene derivatives are being incorporated into various building materials to improve their mechanical properties, durability, and sustainability. The addition of graphene oxide to cement composites, for example, has been shown to enhance compressive strength, thermal conductivity, and resistance to cracking. These improvements not only increase the lifespan of construction materials but also contribute to more energy-efficient buildings. As the construction industry strives for sustainability, graphene-based materials provide an opportunity to reduce environmental impact while improving the performance of key building components.
In the textile industry, the integration of graphene derivatives opens new possibilities for creating advanced, functional fabrics. Graphene oxide and reduced graphene oxide can be incorporated into fibers to enhance mechanical properties such as tensile strength and flexibility. Additionally, these materials can impart valuable features like water resistance, antimicrobial properties, and increased conductivity. The ability to create smart textiles with embedded functionalities offers significant potential for wearable electronics, energy-harvesting fabrics, and enhanced durability in everyday clothing.
As research and development continue, challenges related to the scalable production, cost-effectiveness, and environmental impact of graphene derivatives need to be addressed. Nevertheless, the ongoing progress in these areas highlights the transformative potential of graphene derivatives for improving the performance and functionality of materials in both construction and textile industries.

References

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