

## **Polymer Engineering and Science**

### **An overview of the recent advances in polylactide-based sustainable nanocomposites**

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#### **Abstract**

The article reports recent advances in reference to the existing literature and presents a knowledge gap and potential solution ideas for polylactide (PLA) nanocomposites as sustainable materials. Various types of nanoparticles have been used for the development of PLA nanocomposites; however, this work focuses on PLA nanocomposites of nanoclay, nanocelluloses, carbon nanotube, and graphene. By providing a wholistic overview of the fundamental knowledge pertaining to PLA, and covering all critical aspects related to processing, characterization, and applications of PLA nanocomposites, this review provides a direction for future developments in the field of PLA nanocomposites suitable for various advanced applications, which is still scarce in the literature, including review articles. Moreover, the effects of dispersion/distribution of various types of nanoparticles on the degradation characteristics and special properties, such as cytocompatibility, electrical conductivity, and antimicrobial properties, of PLA nanocomposites are critically reviewed with regard to the nature of nanoparticles used for nanocomposite formation. In summary, this review provides new insight into the design and formulation of advanced PLA nanocomposites for a wide range of applications as sustainable materials.