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Abstract

[illegible] PCL, and PHA, ha

Keywords: Biodegradable Polymer; Graphene; Antibacterial applications

Introduction

Polymers are widely used in a variety of medical applications, [illegible]

Nonetheless, the ebb and ow writing for the most part comprises of unique exploration articles inspecting antibacterial movement and seldom mechanical properties of biodegradable polymer/GRM composites; Consequently, a comprehensive critical review paper that discusses and contrasts the ndings of the extensive available literature is required. e authors are aware of only a few review papers focusing on coatings and GO reinforced polymer nanocomposites. Examples of GRM-reinforced polymer matrix composites (mostly PLA, PVA, PLA, and polymathic methacrylate composites) can be found in these examples. However, they only brie y discuss a small number of composite systems' antimicrobial activity without going into detail about their mechanical properties or processing methods [2, 3, 4, 5].

As a result, we believe that GRMs reinforced biodegradable polymer composites for antibacterial applications require a comprehensive critical review. As a result, the recent di culties associated with the processing and creation of such composites speci cally for clinical applications are the subject of this review's critical evaluation of the relevant literature [6]. e antibacterial activity of biodegradable polymer-based GRMs composites under various in vivo and in vitro conditions is the primary focus. In order to produce biodegradable polymer/GRM composites for antibacterial applications, polysaccharide-based (CS, Cel, and alginate), protein-based (Gel and Col), synthetic-based (PLA, PVA, and PCL), and microbial-based (PHA) polymers have been among the most widely considered biomaterials. As a result, the current review provides a comprehensive overview of the current state of the art in relation to the aforementioned polymers GRMs used in biomedical applications are also brie y discussed, their antibacterial functionalization is discussed, and the proposed antibacterial mechanisms are summarized. Based

[illegible]

GRMs, which include GR, GO, FLG, GNP, and rGO, are versatile [illegible] polymers; these can bind to oxygen-containing functional groups in aliphatic polymers, allowing the polymer matrix and GRMs to interact e ectively. e development of composites with superior process ability, good electrical conductivity, relatively high mechanical properties, and most importantly, as discussed in the present review article, a broad-spectrum bactericidal activity has been documented by the exponential increase in the number of studies on GO and GR reinforced composites over the past few years. By incorporating GRMs into various bulk polymers, excellent antibacterial properties and relatively high mechanical properties like fracture strength and modulus can be maintained for biomedical and ltration applications.

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on the classi cation of these polymers that was provided earlier, the antibacterial properties of biodegradable polymer/GRM composites, as well as their microstructural, mechanical, surface, and biological characteristics, are discussed. A brief overview of the investigated processing paths for the creation of these composites is provided. Each composite system's future research directions shed light on how to overcome composite performance challenges like long-term health e ects, time-dependent mechanical properties, toxicity, and durability [7, 8].

PLA is a thermoplastic engineered polymer and an alluring biopolymer given its inexhaustibility, biodegradability and somewhat minimal expense. It has some drawbacks, despite its widespread use in tissue engineering, drug delivery, and food packaging [196]: lack of intrinsic bioactivity, slow crystallization rate, low barrier to oxygen, excessive brittleness, and poor mechanical behaviour [9].

e following are some of the (mostly) GR and GO reinforced biodegradable polymer composites' antibacterial uses that have been critically examined in this article: (1) polysaccharide-based polymers, such as CS, Cel, and alginate; 2) protein-based polymers, such as Gel and Col; 3) synthetic polymers, such as PLA, PVA, and PCL; and 4) microbial polymers made from renewable resources (PHA). e development, processing methods, mechanical properties, and speci cally the antibacterial activity of these composites are all discussed in the paper [10].

None.

e authors declare that they do not have any known personal relationships or competing nancial interests that could have appeared to have in uenced the work reported in this paper.

References

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