

A Review of Carbon Dots-based Nanocomposites in the Photocatalytic Degradation of Pharmaceutical Compounds

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ABSTRACT

Carbon dots (CDs) are types of carbon-based nanomaterials that have recently gained interest from both researchers and scientists due to its diverse and interesting physicochemical attributes such as biocompatibility, tuneable optical properties, low-cost and sufficient functional groups, and photocatalytic properties. Despite its innate advantages, recent studies have been conducted by incorporating some new materials to create a carbon-dots-based nanocomposites (CD-nanocomposite) matrix which enhances a particular property like photocatalytic activity. The desire to create this emerging nanomaterial is to address the prevailing concern of removing the presence of persistent organic pollutants like pharmaceutical compounds which are known to be detrimental to both humans and animals. Photocatalytic degradation is a method of removing harmful substances present in the water using a photocatalyst under light exposure. Photocatalysts are being modified to create CD-nanocomposites intended to degrade this type of pollutant. In this paper, a comprehensive discussion of past and present studies of synthesis and utilization of CD-nanocomposite in the photocatalytic degradation of different pharmaceutical compounds like, antibiotics and paracetamol was presented. This includes the sources of CDs, synthesis methods, mechanism types, and degradation efficiency. In addition, a straightforward presentation of the research gaps and future research opportunities related to the study was established. Finally, this review paper is essential in the extension of research work that would enhance CD-nanocomposites and their application to photocatalysis.

Keywords: carbon dots, nanomaterials, nanocomposites, photocatalysis, pharmaceutical compounds.