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Functionalization of carbon and graphene quantum dots

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Abstract

In recent years, quantum dots (QDs) have been widely explored in the field of optoelectronics due to their exceptional physicochemical properties, including chemical stability, size-dependent optoelectronic properties (e.g., bandgap, and energy levels), high surface area, and mechanical flexibility. Furthermore, the QDs are biocompatible and environmentally friendly materials, which have garnered worldwide interests for use as fluorescent probes in bioimaging. This chapter aims to explain the recent findings on this growing topic and to disseminate critical insights, which would shed light onto the deployment of QDs-related technology, including carbon quantum dots and graphene quantum dots (GQDs) from fundamental research works and the applied sciences domain. Several QDs synthesis approaches and physicochemical property characterizations are explained from the perspectives of experimental and theoretical frameworks. The current trends of research, which would predict challenges, prospective candidates of precursors, fabrication technology and targeted size of the GQDs, are also discussed. © 2023 Elsevier Ltd. All rights reserved.

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