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Recent advances on the preparation and application of graphene quantum dots for mercury detection: a systematic review

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Abstract
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Abstract

The mercury ion (Hg^{2+}) is regarded as one of the toxic cations that is extremely harmful and dangerous to human health and the environment. With this growing awareness, it is imperative that facile and rapid sensing systems developed for the detection of Hg^{2+} . Due to excellent sensitivity and selectivity, graphene quantum dots (GQDs), a zero-dimensional carbon nanomaterial, are attracting the attention of researchers as promising candidates as fluorescent probes for Hg^{2+} detection. This study aimed at conducting an in-depth review of recent advances into GQD-based materials as fluorescent probes in Hg^{2+} sensing. This systematic review was carried out by covering three main databases, namely, Scopus and Science Direct as the dominant databases, followed by Google Scholar as the supporting database. GQD-based materials encompassing bare GQDs, N-GQDs, B, N-GQDs, N, S-GQDs, N, K-GQDs, RhB-GQDs, Cys-GQDs, PEHA-GQD-DPA, Gly-GQDs, Mn(II)-N-GQDs, $\text{NH}_2\text{-Ru@SiO}_2\text{-NGQDs}$ and FA-GQDs were discussed thoroughly with regard to their synthesis strategies, along with their potential application in the detection of Hg^{2+} . The doping of heteroatoms is envisaged to enhance the quantum yield and selectivity of bare GQDs. This review might unlock a wide range of opportunities for the application of various GQD-based materials as an adaptable, feasible and scalable approach to the detection of Hg^{2+} . © 2021, Korean Carbon Society.

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Detection ; Graphene quantum dots ; Hg; Mercury ; Systematic review

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