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Title: Graphene Based Nanocomposites: A State of the Art in Heavy Metal Detection

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Abstract: A massive rise in anthropogenic activities in the last few decades has substantially exposed human life to different heavy metal (HM) with high toxicological implications, when present over permissible limits. Hence, detection of these elements, even in trace amounts, becomes pivotal for maintaining quality of life. Several materials have been employed to serve this purpose, out of which graphene and its nanocomposites have exhibited true potential in detection of HM ions present in various environmental and food samples with very minimal limit of detection (LOD). The excellent large surface area, optical, electrical, thermal, and mechanical properties of graphene bestow the hybrid materials with true potential to serve as appropriate sensing platforms for HM ions. This review provides a concise view towards graphene, its derivatives, detection methods, and utilization of graphene in sensing of mercury, arsenic, cadmium, lead, and copper ions in different media. Latest development of smart graphene-based nanostructured biosensors in the last decade, which reveal extraordinary selectivity and sensitivity towards these hazardous substances with unparalleled stability enabling them an essential tool in the field of environmental remediation, are also highlighted in this review.



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