The role of MOF based nanocomposites in the detection of phenolic compounds for environmental remediation- A review

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Abstract

Phenolic compounds would be the emerging pollutant by 2050, because of their wide spread applicability in daily life and therefore the adoption of suitable detection methods in which identification and separation of isomers is highly desirable. Owing to the fascinating features, Metal-organic framework (MOF), a class of reticular materials holds a large surface area with tunable shape and adjustable porosity will provide strong interaction with analytes through abundant functional groups resulting in high selectivity towards electrochemical determination of phenolic isomers. Nevertheless, the sensing performance can still be further improved by building MOF network (intrinsic resistance) with functional (conducting) materials, resulting in MOF based nanocomposite. Herein, this review provides the summary of MOF based nanocomposites for electrochemical sensing of phenolic compounds developed from 2015. In this review, we discussed the demerits of pristine MOF as electrode materials, and the requirement of new class of MOF with functional materials such as nanomaterials, carbon nanotubes, graphene and MXene. The history and evolution of MOF nanocomposite-based materials are discussed and also featured the impressive physical and chemical properties. Besides this review discusses the factors influencing the conducting pathway and mass transport of MOF based nanocomposite for enhanced sensing performance of phenolic compounds with suitable mechanistic illustrations. Finally, the major challenges governing the determination of phenolic compounds and the future advancements required for the development of MOF based electrodes for various applications are highlighted. © 2022 Elsevier Ltd

Author keywords

Electrochemical sensor; Environmental remediation; Metal organic frameworks; Modified electrode; Phenolic compounds; Pollutant