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Review

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Shaobin Wang, Hongqi Sun, H.M. Ang, M.O. Tadé

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Adsorptive remediation of environmental pollutants using novel graphene-based nanomaterials

Shaobin Wang,* Hongqi Sun, H.M. Ang, M. O. Tadé

Department of Chemical Engineering and CRC for Contamination Assessment and Remediation of the Environment (CRC-CARE), Curtin University, GPO Box U1987, Perth, WA 6845, Australia

*Correspondence author. E-mail: Shaobin.wang@curtin.edu.au

Abstract

Pollution of air, water and soil is a worldwide issue for the eco-environment and human society. Removal of various pollutants including inorganic and organic compounds from the environment is a big challenge. Adsorption techniques are usually simple and work effectively. However, the adsorption capacities of materials depend on their porous structure and surface properties. Graphene oxide and graphene are new carbonaceous nanomaterials. Graphene has a large theoretical specific surface area and graphene oxide has functional groups, indicating their potential for the adsorption processes. In the past few years, many investigations have been focused on the applications of graphene or composites in removal of pollutants from air and water. In this paper, we will review recent advances in graphene-related nanomaterials for adsorptive treatment of environmental pollution. Graphene oxide possesses several functional groups and strong acidity, exhibiting high adsorption for basic compounds and cations while graphene shows hydrophobic surface and presents high adsorption to chemicals due to strong π - π interaction. Modification of graphene oxide or graphene with metal oxides or organics can produce various nanocomposites, enhancing adsorption capacity and separation efficiency. Activation of graphene into porous carbonaceous material will be a promising way to further enhance adsorption capacity.

Key words: Adsorption; graphene oxide; graphene; pollutants; activation

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