

Accepted Manuscript

Sodium alginate/graphene oxide hydrogel beads as permeable reactive barrier material for the remediation of ciprofloxacin-contaminated groundwater

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PII: S0045-6535(18)30369-2

DOI: [10.1016/j.chemosphere.2018.02.157](https://doi.org/10.1016/j.chemosphere.2018.02.157)

Reference: CHEM 20915

To appear in: *ECSN*

Received Date: 23 July 2017

Revised Date: 22 February 2018

Accepted Date: 25 February 2018

Please cite this article as: Zhao, P., Yu, F., Wang, R., Ma, Y., Wu, Y., Sodium alginate/graphene oxide hydrogel beads as permeable reactive barrier material for the remediation of ciprofloxacin-contaminated groundwater, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.02.157.

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1 **Sodium Alginate/Graphene Oxide Hydrogel Beads as Permeable Reactive**
2 **Barrier Material for the Remediation of Ciprofloxacin-Contaminated**
3 **Groundwater**

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12 **Abstract:** The wide occurrence of antibiotics in groundwater has raised serious
13 concerns due to their impacts on humans and the ecosystem. Most of the research in
14 groundwater remediation focuses on the exploitation of nano-materials. However,
15 nano-materials have several disadvantages such as high production cost, rapid
16 reduction in permeability, disposal problems, and high sensitivity to environmental
17 conditions. To solve these issues, novel sodium alginate/graphene oxide hydrogel
18 beads (GSA) were synthesised and their effectiveness as permeable reactive barrier
19 (PRB) backfill material in the remediation of ciprofloxacin (CPX)-contaminated
20 groundwater was tested. The adsorption of CPX onto GSA followed the
21 pseudo-second-order kinetic model. The isotherm data followed the Freundlich model.
22 The maximum adsorption capacity was 100 mg g⁻¹ at pH 7.0. The adsorption process
23 was sensitive to contact time, initial CPX concentration and ionic strength. However,

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