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**Polypyrrole-Reduced Graphene Oxide Nanocomposite Hydrogels:
A Promising electrode material for the simultaneous detection of multiple
heavy metal ions.**

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Highlights

- A novel Polypyrrole-reduced graphene oxide hydrogel composite electrode was developed for the detection of Pb²⁺ ions.
- The detection limit was found to be 0.3 nM for Pb²⁺ ions with large linear concentration ranges.
- The developed sensor was applied for the quantification of various metal ions in the environmental waste water.

Abstract

We have studied the formation of novel hydrogels of conjugate polymer polypyrrole (PPy) and reduced graphene oxide (rGO) for the simultaneous detection of four different metal ions such as Cd²⁺, Pb²⁺, Cu²⁺ and Hg²⁺. PPy-rGO hydrogel composite exhibits very high surface area of 21.48 m² g⁻¹, which is almost 3.5 times higher than that of PPy (5.89 m² g⁻¹). The achieved detection limits were much lesser than the world health organisation (WHO) threshold limits and also very less compared to many polymer based heavy metal sensors.

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