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Granular activated carbon was customized with a chemical grafting procedure of a nanoporous polymeric network for the purpose of nanoscale zero-valent iron impregnation and subsequent water contaminant remediation. Characterization of the prepared composite material revealed that not only was the polymer attachment and iron impregnation successful, but also that the polymeric shell acted as a protective barrier against the effects of oxidation from the surrounding environment, nearly 99% of total iron content was in the form of zero-valent iron. When applied towards the remediation of two common water contaminants, nitrobenzene and nitrate, the composite material exploited the qualities of both the activated carbon and the polymeric network to work together in a synergistic manner. In that the increased protection from oxidation allowed for increased reactivity of the nanoscale zero-valent iron, and that the adsorption abilities of both the carbon and the polymer achieved a higher amount of total removal of the contaminants.

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