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TiO₂ nanoparticles in sediments: Effect on the bioavailability of heavy metals in the freshwater bivalve *Corbicula fluminea*

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Highlights

- Heavy metals can be adsorbed on TiO₂ NP surface in sediment.
- TiO₂ NPs in sediments changed the speciation distribution of heavy metals.
- TiO₂ NPs enhanced the bioavailability of EXC, CAR, and IMO
- TiO₂ NPs increased metals accumulation in *C. fluminea* by Trojan horse effect

Abstract

Most studies investigating the influence of TiO₂ NPs on heavy metal bioavailability have focused on the aqueous phase; however, few have examined the sediments containing more nanoparticles. Here, we investigated the effects of TiO₂ NPs on heavy metal bioavailability in *C. fluminea* in sediments. The interactions between the TiO₂ NPs and metals in sediments, the influence of TiO₂ NPs on metals levels in aqueous phase and geochemical speciation were also explored. The results indicated the large adsorption capacity of TiO₂ NPs and the strong adsorption affinity to metals caused the metals adsorbed on nanoparticles, which decreased the metals concentrations in water phase. Changes in metal speciation caused by metals in EXC, CAR, and IMO partly transported from sediments to TiO₂ NPs during the aging of sediments. Heavy metals contents in *C. fluminea* tissues were in the order of gill > visceral mass > mantle > foot and increased with the increasing TiO₂ NPs contents in

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