

A facile approach for metal ion detection in aqueous media using polyethylene imine/PSMA
fluorescent hairy particle

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A facile approach was developed to produce a dye-doped hairy particles chemosensor for detecting metal ion in aqueous media. Hairy particles were prepared by immobilization of polyethyleneimine (PEI) on the surface of PSMA [poly(styrene-co-maleic anhydride)] spheres. The hairy particle sensor was prepared by a surfactant-free polymerization, followed by the doping of the fluorescent dye NR [Nile red] into the particles. For the hairy particles, the hydrophilic PEI chain segments serve as the hairy and the hydrophobic site PS constitutes the core of the hairy particle. The non-toxic and biocompatible PEI chain segments on the hairy particle surface exhibit a high affinity for metal ion in aqueous media, and the quenching of the NR fluorescence is observed upon binding of metal ions. This makes the hairy particle system a water-dispersible chemosensor for metal ion detection. The quenching of fluorescence arises through intraparticle energy transfer (FRET) from the dye in the hydrophobic PSMA core to the metal ion/PEI complexes on the hairy particle surface. This emulsifier-free, biocompatible and sensitive fluorescent hairy particle sensor may find applications in cupric ion detection in the biological and environmental areas.