

# Janus magnetic colloids for elimination of hydrophilic and hydrophobic microplastics

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## Abstract

The study explores the synthesis and versatile properties of amphiprotic magnetic particles (AMPs) achieved through sequential coatings. Modulating the hydrophobic content in the synthesis process allows for the formation of hydrophilic, amphiprotic, and hydrophobic magnetic particles, with stable AMP synthesis achieved at a ratio of hydrophilic to hydrophobic portions of approximately 71% to 29%. These AMPs exhibited outstanding dispersion in both oil and water within an oil/water mixture. Polyethyleneimine (PEI) in the AMP primarily enhances the removal of hydrophilic microparticles (MPs) and facilitates dispersion in water. On the other hand, octadecylamine (ODA) is specifically designed for the effective elimination of hydrophobic MPs and their dispersion in oil. AMPs demonstrated effective removal capabilities for both hydrophilic and hydrophobic MPs in water, as well as hydrophobic MPs in 100% oil. Our approach is also suited for eliminating hydrophobic MPs dispersed in small quantities of oil floating on large bodies of water in real-world situations.

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## References

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