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FACILE PREPARATION OF OXIDATION RESISTANT MAGNETITE-BASED NANOCOMPOSITES FOR WATER TREATMENTS

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Magnetite nanoparticles (MNPs) - based nanocomposites are promising for drinking water and ballast water treatments due to their easy synthesis and magnetic recyclability. The bifunctional nanocomposite we recently prepared by incorporating both MNPs and silver nanoparticles into activated carbon matrix has demonstrated recoverability and reusability with high antimicrobial efficiency for water disinfection. However, prolonged exposure of MNPs to the dissolved oxygen in water converts iron (II) ions to iron (III) ions, weakening the magnetic responsiveness and reducing the recovery rates for the nanocomposites. In this work, we explore various strategies inhibiting the access of oxygen to the MNPs and preventing them from being oxidized in water. This includes capping the MNPs with inorganic, organic, and surfactant agents. The effectiveness is evaluated based on their oxidation resistance in water. The nanocomposites with protected MNPs are evaluated for their recoverability and ability to remove water pollutants and/or disinfect water.

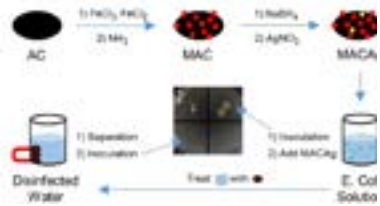

Figure 1: Magnetically recyclable and reusable antimicrobial nanocomposite based on activated carbon, magnetite nanoparticles, and silver nanoparticles for water disinfection

Recent Publications

1. **P Y Furlan, A J Fisher, A Y Furlan, M E Melcer, D W Shinn and J B Warren (2017) Magnetically recoverable and reusable antimicrobial nanocomposite based on activated carbon, magnetite nanoparticles, and silver nanoparticles for water disinfection. Inventions doi: 10.3390/inventions2020010.**
2. **P Y Furlan, A J Fisher, M E Melcer, A Y Furlan and J B Warren (2017) Preparing and testing a magnetic antimicrobial silver nanocomposite for water disinfection to gain experience at the nanochemistry-microbiology interface. Journal of Chemical Education 94(4):488-493.**
3. **P Y Furlan, Brian Ackerman, Mike Melcer and Sergio Perez (2016) Reusable magnetic nanocomposite sponges for removing oil from water discharges. Journal of Ship Production and Design DOI: https://doi.org/10.5957/JSPD.32.4.160017.**
4. **S Perez, P Furlan, S Ellenberger, P Banker (2016) Estimating diluted bitumen entrained by suspended sediments in river rapids using O_2 absorption rate. Int. J. Environ. Sci. Technol. 13(2):403-412.**
5. **P Y Furlan and M Melcer (2014) Removal of organic water pollutant surrogate by recyclable magnetite-activated carbon nanocomposite: an experiment for general chemistry. Journal of Chemical Education 91(11):1966-1970.**

Biography

Ping Furlan is a Professor in Chemistry with 21 years of academic experience at the U.S. Merchant Marine Academy since 2011 and in the University of Pittsburgh during 1997-2011. She is an Active member of American Chemical Society (ACS) and leader of various ACS major science outreach programs and 2016 Middle Atlantic Regional Meeting. She has done her research with numerous publications, grants and invited presentations in the areas of developing nanomaterials for marine pollution prevention; nanoscience and technology curriculum materials; and chemistry in maritime industry curriculum materials. Her recent ACS recognitions include 2017 Middle Atlantic Regional Partners for Progress and Prosperity Award, 2016 Outreach Volunteer of the Year Award, 2016 National ChemiLuminary Award Finalist, 2015 E. Ann Nalley Middle Atlantic Regional Award, and 2014 New York Section Distinguished Service Award for Leading National Chemistry Week.

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