Design of Multifunctional Magnetic Nanoparticle for Separating and Combating Waterborne Pathogen

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Water is essential for human life. As per the World Health Organization (WHO), even in the twenty first century, safe drinking water without toxic metal and waterborne pathogens is lacking for 2.1 million people worldwide! A recent report by the United Nations Children's Fund (UNICEF) indicates that more than 10 million deaths of children under the age of five every year due to the unavailability of safe water. Similarly, Centers for Disease Control and Prevention (CDC) reports indicate that 7.2 million Americans get sick every year from diseases spread through water by waterborne pathogens like Escherichia coli O157:H7, Cryptosporidium, and rotavirus. A recent report by WHO indicates that waterborne pathogens cause significant disease burden to our society, and it is responsible for global economic loss of US$260 billion annually. Driven by the urgent need for society, here I will discuss the chemical design of chitosan coated Fe3O4 based magnetic nanoparticles, which can be used for effective separation and disinfection of waterborne pathogens from environmental water samples.

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