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## Patent Search

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#### Abstract:

The present invention relates to the use of bio-functionalized iron oxide nanoparticles for efficient water purification. The nanoparticles are functionalized with biomolecules that selectively bind with specific contaminants in water, making them highly efficient in removing contaminants from water. The nanoparticles can be regenerated and used in conjunction with other water purification technologies to enhance their efficiency. The invention also has potential applications in biomedical engineering, where the nanoparticles can be functionalized for targeted drug delivery and magnetic hyperthermia. The invention presents a promising technology for addressing the global issue of improving water quality, and providing access to clean and safe water.

#### Complete Specification

**Description:**The field of invention of the proposed invention is nanotechnology and its application in water purification. Specifically, the invention relates to the development of bio-functional iron oxide nanoparticles for efficient water purification.

**Background of the proposed invention:**

Access to clean and safe drinking water is essential for human health and well-being. However, the increasing contamination of water resources due to human activities and natural phenomena poses a significant challenge to water management and public health. Pollutants such as heavy metals, organic compounds, and microorganisms can have adverse effects on human health and the environment. Therefore, there is a critical need for effective and sustainable water purification technologies that remove these contaminants and ensure safe drinking water for all.

In recent years, nanotechnology has emerged as a promising approach for water purification due to its unique properties such as high surface area, size-dependent reactivity, and tunable surface chemistry. Among the various types of nanoparticles, iron oxide nanoparticles have gained significant attention for their potential use in water purification due to their magnetic properties and ability to adsorb and degrade contaminants. However, their efficiency in water purification is limited by factors such as agglomeration, poor dispersion, and lack of selectivity towards specific contaminants.

To overcome these limitations and enhance the efficiency of iron oxide nanoparticles in water purification, the proposed invention focuses on the development of bio-functionalized iron oxide nanoparticles. The use of bio-functionalization can enhance the selectivity and efficiency of iron oxide nanoparticles in removing specific contaminants from water.

Bio-functionalization involves the modification of nanoparticles with biomolecules such as enzymes, antibodies, or DNA. These biomolecules can selectively bind to

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