

Tuned Multifunctional Magnetic Nanoparticles for Nanomedicine

This technology is a theranostic magnetic nanoprobe comprised of magnetic nanoparticles for magnetic particle imaging. The ferromagnetic core nanoparticles have long-term stability in water, biocompatibility and low toxicity, and can be surface coated for potential applications in oncology and atherosclerosis.

What is the Problem?

Magnetic nanoparticles are attractive agents for biomedicine due to strong intrinsic magnetism that, through interaction with a magnetic field, enables their detection or influence from deep within a living subject. Magnetic nanoparticles have been studied extensively as potential contrast agents or nanoparticle materials in molecular imaging applications based on magnetic resonance imaging, as well as carriers for magnetically assisted drug delivery and hyperthermia. Magnetic particle imaging (MPI) is a new technique for visualizing magnetic nanoparticles in humans and animals. MPI is fast, quantitative, sensitive, and features good spatial resolution. However, current magnetic nanoparticles are not optimized for MPI, preventing realization of the full potential of the technique.

What is the Solution?

The solution is a new class of theranostic magnetic nanoprobes, that comprise of nanoscale ferromagnetic cores of defect-free and high phase purity magnetite. These particles have a tailored size and narrow size-distribution, are tailored for specific magnetic response, and are non-toxic and individually conjugated with different surface molecules to alter their functionality and biodistribution.

What Differentiates it from Solutions Available Today?

Existing solutions are far from being magnetically optimized for MPI and thus inhibit MPI from reaching its full potential in terms of both spatial resolution and mass sensitivity. This solution provides magnetic nanoparticles optimized for MPI, allowing for higher spatial resolution and mass sensitivity. There is flexibility and precision with which the physical properties of the nanoparticle core can be adjusted for different use cases. They also have long-term stability in water and biological media, biocompatibility and very low toxicity, and a wide array of molecules that can be used to coat the surface. Of the numerous applications, there is great potential in oncology and atherosclerosis.

Technology ID

BDP 8668

Category

Device/Imaging
Selection of Available
Technologies

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Patent Information:

[US9259492B2](#)

[US9555136B2](#)

References

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