



TECHNOLOGY LICENSING OPPORTUNITIES

FORENSICS & DIAGNOSTIC SOLUTIONS LICENSING OPPORTUNITIES

Separation Particles

Invention Summary

Magnetic particles for the separation and manipulation of biological compounds, in particular streptavidin-derivatised colloidal Fe_3O_4 particles.

Background

Many molecular biological methods make use of the capture and solid-phase manipulation of compounds. Such methods include solid-phase DNA sequencing, DNA/RNA hybridisation, separation of PCR products, labelling of single-stranded nucleic acid probes, gene assembly, in vitro mutagenesis, yeast artificial chromosome (YAC)-screening, DNA cloning, sequence-specific purification of DNA/RNA binding proteins, cell separation and isolation of bacteria etc.

A number of capture methods rely on the interaction between biotin and biotin-binding proteins such as avidin or streptavidin. Streptavidin is a preferred biotin-binding protein as it has four identical subunits each of which has a high affinity binding site for biotin making it suitable for use in the rapid and efficient isolation of biotin-labelled target molecules. The appropriate biotinylated compounds vary according to the application but include compounds such as double-stranded and single-stranded DNA, RNA, proteins, sugars and lectins.

A popular method for such capture and solid-phase manipulation relies upon the use of streptavidin-coated monodisperse magnetic particles which are highly uniform, superparamagnetic, polystyrene beads coated with a polyurethane layer. However, such beads are expensive and cumbersome to produce.

Other methods are known but are also complex and costly to produce. There is therefore a need to provide a simple composition of magnetic particles for the separation and manipulation of biological compounds that can be prepared more readily and more cheaply than the known products.

Technology

It has been found that colloidal Fe_3O_4 particles can be synthesized and that these particles can be coated with a biotin-binding protein such as streptavidin. The coated particles have a high iron content (approximately 72%) aiding the speed and efficiency of magnetic separations. They also display excellent performance for the capture and solid-phase manipulation of biotinylated compounds such as biotinylated PCR product strands. These particles are particularly suitable for automated processes.

Also provided is a method for making the streptavidin-coated composition, which includes the steps of forming colloidal Fe_3O_4 particles by mixing aqueous FeCl_2 with aqueous FeCl_3 , adding aliquots of the mixture to an alkaline solution and adding streptavidin.

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