



## 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  $\text{Fe}_3\text{O}_4$  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  $\text{Fe}_3\text{O}_4$  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  $\text{Fe}_3\text{O}_4$  particles by mixing aqueous  $\text{FeCl}_2$  with aqueous  $\text{FeCl}_3$ , adding aliquots of the mixture to an alkaline solution and adding streptavidin.

**Inventor:**  
Michael Alan Reeve

**Patent family:**  
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GB2368909B  
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**Licensing Contact:**  
Louise Sarup  
louise.sarup@cytiva.com