

Magnetic Microparticles

Description

- Superparamagnetic particles yield fast, efficient separations.
- Polymer spheroid particles, ~1-2 μ m.
- Surface for passive adsorption or covalent coupling.

Our polymer synthesis group, a world leader in the field of polystyrene latex manufacturing, has developed a unique polymer-iron particle hybrid. These particles are superparamagnetic, and will respond to a magnetic field while easily resuspending upon its removal. This has been accomplished by incorporating small quantities of the iron oxide throughout the polymer. Thus, relatively large amounts of iron (>20%) can be introduced into the particle without the particles retaining residual magnetism (remanence).

Properties and Advantages

The polymer matrix allows us to control many of the other variables necessary for successful biomedical applications. Some of the unique features that a polystyrene magnetic particle has include:

- Low density - 2 gm/cm³ or less will remain suspended for long periods of time.
- Spheroid morphology - uniform surface area for coatings.
- High coating capacity.

The magnetic content of these particles is utilized as a fast, efficient means of separating the particles from the supernatant. The particles are packaged in deionized water. Separations can be realized in minutes using laboratory (rare earth) magnets. The special properties of these magnetic particles are listed below:

- Easily dispersed after attraction to a magnetic field, gentle sonication or simply shaking the container.
- No leaching of iron from the particles.
- Particles are compatible with aqueous systems.
- Repeated centrifugation is avoided through magnetic separations.

Cellular Isolation Applications

These particles are typically used for molecular or cellular isolations.¹ For example, immunoglobulins targeting the desired material can be attached to the surface of the particles for directed isolation. A typical isolation of selected lymphocytes is outlined below:

1. Mononuclear cells may be isolated from whole blood or partially purified by any of a number of centrifugation techniques using density gradient media² or Nylon Wool Fiber filtration (Cat. #18369).
2. Wash cells in the appropriate cell suspension for the particular cell line.
3. Prepare antibody coated magnetic particles using the protocols outlined in Technical Data Sheets #238E and #238D.
4. Incubate the cell suspension and the coated beads. The reaction should be completed in a brief amount of time, with successful binding achieved in 15 to 60 minutes with gentle agitation or mixing. The amount of beads to be added is generally about 10 times the number cells to be isolated. This will result in an excess of the beads as fewer than 5 beads are bound per cell.
5. Subject a diluted amount of the incubation mixture to a moderate magnetic field and pipet off the supernatant.
6. Wash the resultant material three times.

Diagnostic Applications

The magnetic particles can be used as solid supports for immunoassays in single use or automated assays. Automated assays using the magnetic particles can quickly wash or separate reaction components to reduce assay time or increase performance. The ability of polystyrene to bind protein molecules without significantly changing the biochemical activities is the basis for most particle immunoassays.⁴ Our use of polystyrene as the backbone of these particles is crucial to the easy assimilation of our particles into most binding protocols.

Protein Coating

As the particles are polystyrene or functionalized polystyrene, typical coating methods will apply. See Technical Data Sheet #238E (*Adsorption to Polystyrene*) and #238D (*Glutaraldehyde Coupling to Amine Functionalized Particles*) for general protocols in which magnetic separations may be substituted for centrifugation steps.

Handling Information

The particles are packaged in de-ionized water with residual surfactant. We do not incorporate biocides at time of manufacture. The particles are stable to additions of biocides, such as sodium azide or thimerosol. Particle suspensions can be sterilized by gamma radiation, however, autoclaving can result in irreversible aggregation. The particles should be stored at 4°C.

References

1. Hirschbein, B., et al. 1982. Magnetic separations in chemistry and biochemistry. *Chemtech*, March.
2. Boyum, A. 1984. *Methods in Enzymology*, p. 108, 88.
3. Treleaven, J.G., et al. 1984. *The Lancet*, January: 70.
4. Karo, W. 1990. *Today's Chemist*, 3(3): 12.

This product is for research use only and is not intended for use in humans or for *in vitro* diagnostic use.

Ordering Information

Cat. #	Description	Sizes
19133	Fluorescent YG Superparamagnetic Microspheres, ~1-2µm	2ml or 5ml
18879	Amino Superparamagnetic Microspheres, ~1-2µm	2ml or 5ml
19772	Neodymium Iron Magnet Unit (block magnet)	1 ea
8MB4112S	BioMag® Solo-Sep Microcentrifuge Tube Separator	1 ea
8MB4111S	BioMag® Multi-6 Microcentrifuge Tube Separator	1 ea
84102S	BioMag® 15ml/50ml Tube Separator	1 ea

Also, please see our extensive BioMag® line of superparamagnetic particles, our highly uniform ProMag™ microspheres, and our complete line of magnetic separators online at www.polysciences.com.

To Order

In The U.S. Call: 1-800-523-2575 • 215-343-6484

In The U.S. FAX: 1-800-343-3291 • 215-343-0214

In Germany Call: (49) 6221-765767

In Germany FAX: (49) 6221-764620

Order online anytime at www.polysciences.com.