SPHERO™ Ferromagnetic Particles

- Manufactured by coating a layer of chromium dioxide and polystyrene onto polystyrene core particles
- Retains magnetism once exposed to a magnetic field
- Exhibits a higher magnetic moment then paramagnetic particles
- Have been used for magnetic twisting cytometry, microfluidics, and cellular labeling.

Unlike paramagnetic particles that are made using iron oxide, SPHERO™ Ferromagnetic Particles are prepared using chromium dioxide coated onto uniform polystyrene particles. These particles retain magnetism once exposed to a magnetic field. The particles can be demagnetized and re-magnetized repeatedly and reproducibly. Ferromagnetic particles have been used for studying mechanotransduction across the cell surface and through the cytoskelaton. This is performed by binding them to cell surface receptors and applying mechanical stress directly to the receptor using a device to twist the magnetic particle.

SPHERO™ Amino Ferromagnetic Particles

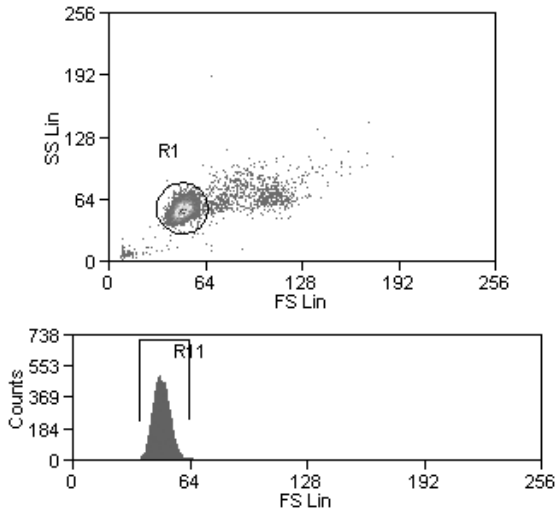
Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Amino Ferromagnetic	4.0-4.5	1.0	AFM-40-10	10 mL

Hystersis data of Cat. No. AFM-40-10 ferromagnetic beads measured at 285, 250 and 200K under a maximum applied field of 4kOe has been reported by De Los Santos V, L., J. Llandro, et al. (2009), "Magnetic measurements of suspended functionalised ferromagnetic beads under DC applied fields." *Journal of Magnetism & Magnetic Materials* 321(14): 2129-2134.

SPHERO™ Carboxyl Ferromagnetic Particles

Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Carboxyl Ferromagnetic	2.0-2.9	1.0	CFM-20-10	10 mL
Carboxyl Ferromagnetic	4.0-4.9	1.0	CFM-40-10	10 mL
Carboxyl Ferromagnetic	6.0-7.9	1.0	CFM-60-5	5 mL
Carboxyl Ferromagnetic	8.0-8.9	1.0	CFM-80-5	5 mL
Carboxyl Ferromagnetic	28.0-34.9	0.5	CFM-300-5	5 mL
Carboxyl Ferromagnetic	90.0-120.0	1.0	CFM-1000-5	5 mL
Carboxyl Ferromagnetic Particles, Cross-linked, granules, non-uniform	~1-2 µm	1.0	CFMX-10-10	10 mL

Figure 101 Histograms of Cat. No. CFM-40-10 (Carboxyl Ferromagnetic Particles, 1.0% w/v, 4.93 um, 10 mL).



SPHERO™ Fluorescent Carboxyl Ferromagnetic Particles

Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Fluorescent Yellow Carboxyl Ferromagnetic	2.0-2.9	1.0	FCFM-2052-2	2 mL
Fluorescent Yellow Carboxyl Ferromagnetic	4.0-4.9	1.0	FCFM-4052-2	2 mL
Fluorescent Nile Red Carboxyl Ferromagnetic	4.0-4.9	1.0	FCFM-4056-2	2 mL
Fluorescent Nile Red Carboxyl Ferromagnetic	5.0-5.9	1.0	FCFM-5056-2	2 mL
Fluorescent Yellow Carboxyl Ferromagnetic	38.0-44.0	1.0	FCFM-40052-2	2 mL

SPHERO™ Fluorescent Magnetic Particles

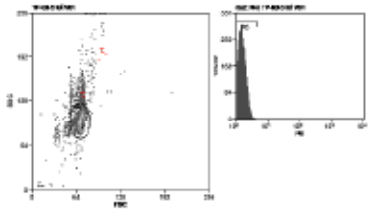
Consists of paramagnetic particles made by either staining the polystyrene core or polymerizing a fluorophore in styrene in the presence of polystyrene core particles.

SPHERO™ Fluorescent Magnetic Particles

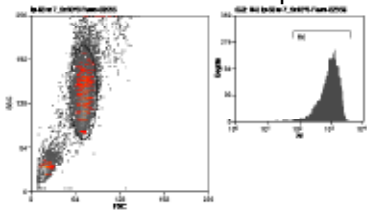
Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Fluorescent Magnetic, Nile Red,	4.0-4.9	1.0	FPM-4056-2	2 mL
Fluorescent Magnetic, UV	5.0-5.9	0.1	FPM-5041-2	2 mL

Figure 102 Histograms of the magnetic separation of Biotin beads (Cat. No. TP-60-5) after exposure to streptavidin coated carboxyl fluorescent magnetic particles, nile red (Cat. No. FSVM-02556-5).

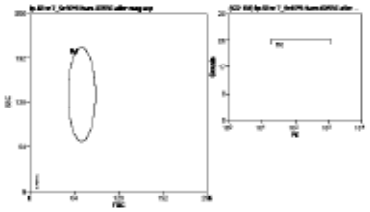
A. Biotin beads before exposure.



B. Biotin beads after exposure.



C. Biotin beads after magnetic separation.



SPHERO™ Amino Fluorescent Magnetic Particles

Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Fluorescent Amino Magnetic ,Yellow	2.0-2.9	1.0	FAM-2052-2	2 mL
Fluorescent Amino Magnetic, Pink	2.0-2.9	1.0	FAM-2058-2	2 mL
Fluorescent Amino Magnetic, Nile Red,	4.0-4.9	1.0	FAM-4056-2	2 mL
Fluorescent Jeffamine®, Magnetic, Nile Red	0.2-0.39	0.1	FJAM-02556-2	2 mL

JEFFAMINE® is a registered trademark of Huntsman Corporation

SPHERO™ Carboxyl Fluorescent Magnetic Particles

Particle Type and Surface	Size, µm	% w/v	Catalog No.	Unit
Fluorescent Carboxyl Magnetic, Nile Red	0.2-0.39	1.0	FCM-02556-2	2 mL
Fluorescent Carboxyl Magnetic, High Iron, Yellow	0.4-0.69	0.5	FCM-0552-2H	2 mL
Fluorescent Carboxyl Magnetic,, Nile Red	0.4-0.69	0.5	FCM-0556-2	2 mL
Fluorescent Carboxyl, Magnetic, Yellow	0.7-0.9	1.0	FCM-0852-2	2 mL
Fluorescent Carboxyl, Magnetic, Nile Red	0.7-0.9	1.0	FCM-0856-2	2 mL
Fluorescent Carboxyl Magnetic, Light Yellow	1.0-1.4	1.0	FCM-1045-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	1.0-1.4	1.0	FCM-1052-2	2 mL
Fluorescent Carboxyl Magnetic, Nile Red	1.0-1.4	1.0	FCM-1056-2	2 mL
Fluorescent Carboxyl Magnetic, Pink	1.0-1.4	1.0	FCM-1058-2	2 mL
Fluorescent Carboxyl Magnetic, Blue	1.0-1.4	1.0	FCM-1068-2	2 mL
Fluorescent Carboxyl Magnetic, Sky Blue	1.0-1.4	1.0	FCM-1070-2	2 mL
Fluorescent Carboxyl Magnetic, UV/ Light Yellow	2.0-2.4	1.0	FCM-2042-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	2.0-2.4	1.0	FCM-2052-2	2 mL
Fluorescent Carboxyl Magnetic, Pink	2.0-2.4	1.0	FCM-2058-2	2 mL
Fluorescent Carboxyl Magnetic, Purple	2.0-2.4	1.0	FCM-2062-2	2 mL
Fluorescent Carboxyl Magnetic, Sky Blue	2.0-2.4	1.0	FCM-2070-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	4.0-4.9	1.0	FCM-4052-2	2 mL
Fluorescent Carboxyl Magnetic, Nile Red	4.0-4.9	1.0	FCM-4056-2	2 mL
Fluorescent Carboxyl Magnetic, Pink	4.0-5.0	1.0	FCM-4058-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	5.0-5.9	1.0	FCM-5052-2	2 mL
Fluorescent Carboxyl Magnetic, UV	7.0-7.9	0.1	FCM-7041-2	2 mL
Fluorescent Carboxyl Magnetic, PAK Blue	7.0-7.9	0.1	FCM-7067-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	8.0-9.9	1.0	FCM-8052-2	2 mL
Fluorescent Carboxyl Magnetic, Nile Red	8.0-9.9	1.0	FCM-8056-2	2 mL
Fluorescent Carboxyl Magnetic, Pink	8.0-9.9	1.0	FCM-8058-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	10.0-14.0	1.0	FCM-10052-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	18.0-24.9	1.0	FCM-20052-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	44.0-52.9	1.0	FCM-50052-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	90-105	1.0	FCM-100052-2	2 mL
Fluorescent Carboxyl Magnetic, Yellow	180-210	1.0	FCM-200052-2	2 mL

SPHERO™ Magnetic Separators

Spherotech has several different designs of magnetic separators. These are used for separating both Paramagnetic and Ferromagnetic particles. They accommodate different size tubes and other receptacles specific to various applications.

A combination of magnetic particles and conventional enzyme immuno assay (EIA) microplate technology offers significant advantages over conventional EIA. Some of the advantages are listed below:

- Magnetic particles offer larger surface area and significantly faster reaction kinetics. As a result, the total time to complete an assay is reduced
- Microparticles are washed more efficiently leaving less residual reactants; thus, lowering background signal and potentially improving sensitivity
- Coating of magnetic particle is easier, provides a more uniform solid phase and helps to minimize lot-to-lot variation.

(A) The SPHERO™ FlexiMag Separator (Cat. No. FMS-1000) is ideal for any laboratory working with magnetic particles for cell separation, immunoassay or affinity purification. It offers the flexibility to meet the small scale requirements of a research laboratory and the large quantity processing of a commercial facility. It uses interchangeable tube holders to secure different size tubes and bottles. The separator comes with a set of three tube holders, Small, Medium and Large. Additional holders can be purchased separately,.

a) The Small holder accommodates four 1.5 mL microfuge or four 10 or 12x75 mm test tubes (8 total)
b) The Medium holder accommodates two 15 mL centrifuge or two 16x100 mm tubes (4 total)
c) The Large holder accommodates two 50 mL centrifuge tubes (4 total)
d) Two 200 mL tissue culture bottles directly without any tube holders.

(B) The SPHERO™ FlexiMag Separator Jr. (Cat. No. FMJ-1000) is designed for small scale use. It holds up to eight 1.5 mL microfuge tubes, 5 mL cryovials, 10x75 mm or 12x75mm tubes.

Magnetic Separator	Catalog No.	Unit
FlexiMag Magnetic Separator, Jr.	FMJ-1000	each
FlexiMag Magnetic Separator	FMS-1000	each
Tube Holder Set for FlexiMag Separator	MSS-1100	set
MiniTube Magnetic Separator	MTMS-16	each
HandiMag Magnetic Separator	HMS-1000	each
MicroMag Magnetic Separator	MMS-2100	each
UltraMag DW Separator (For Deep Well Plates)	UMDS-1000	each
UltraMag Magnetic Separator	UMS-3000	each

(C) The SPHERO™ MicroMag Separator (Cat No. MMS-2100) is designed to fit any 96-well plate with round bottom, flat bottom or V bottom. The magnet will pull the particles to the corner of the well bottom to facilitate the aspiration of supernatant during the washing.

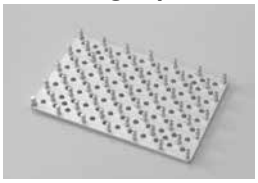
MicroMag Separator

(D) The SPHERO™ HandiMag Separator is a 1"x2"x0.375" Neodymium-Iron-Boron high strength magnet with nickel coating on the surface to prevent corrosion. It can be used to separate the magnetic particles in various containers such as microfuge tubes, test tubes or centrifuge tubes by holding the magnet against the wall of containers by hand or with a rubber band.

(E) The SPHERO™ UltraMag Separator (Cat. No. UMS-3000) and SPHERO™ UltraMag DW Separator (Cat. No. UMDS-1000) are designed to facilitate the washing of magnetic particles in the Magnetic Particles Enzyme Immunoassay (MPEIA) using 96-well plates. The magnetic pegs of UltraMag Separator fit between the wells underneath the 96-well plate. The microplate is read in an appropriate microtiter plate reader by loading the microplate with the attached UltraMag Separator into the reader. The magnets ensure that the magnetic particles stay out of the light beam passing through the bottom of the well and corresponding holes in the UltraMag Separator.

FlexiMag Separator Jr.

UltraMag Separator



UltraMag DW Separator