Biomagnetic Separation and Resuspension

Overview
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Summary: In Vitro Diagnostics (IVD) and Life Science applications are increasing their use of magnetic particles, and therefore the improvement of magnetic separation continues to develop at Dexter Magnetic Technologies (DMT). Moreover, a magnetic resuspension solution has been developed to mix the beads after separation.

Biomagnetic Separation and Resuspension Overview

In Vitro Diagnostics (IVD) and Life Science applications are increasing their use of magnetic particles, and therefore the improvement of magnetic separation continues to develop at Dexter Magnetic Technologies (DMT). Since the early 2000's, DMT has been one of the original owners of magnetic separation patents. Whether the end use includes cell sorting, RNA/ DNA isolation and/or purification, or immunology, DMT can custom design high gradient magnetic separators (HGMS) to achieve the desired separation. These tailored separation designs can accommodate speed, a precision location, unique shapes (see Fig.1 for examples), high particle retention, and total target yield. Moreover, the system designer can consider parameters to limit particle aggregation and/or damage. The key parameters to a high-quality magnetic separator are the magnetic materials, geometry, configuration, and initial magnetization. Through the optimal design of these magnetic circuits, a high magnetic field gradient is produced and gives these separators their power. One of the great features about permanent magnet separators is that they don't require maintenance or replacement over time. If they aren't being used in extreme environmental conditions, permanent magnets will never lose their high level of magnetism and can be used for long term efforts providing extreme reliability.

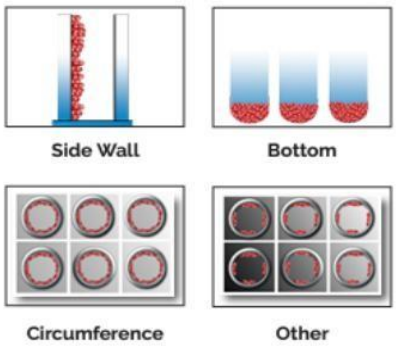

Figure 1: Custom Separation Shaping

Multiple separation zones can be designed into the separators magnetic field to achieve optimal results at different solution volumes.

Whatever your needs are, Dexter can produce the highest quality OEM

assemblies to fit your application. Through private labeling options and unique aesthetic considerations, the product you purchase can truly fit in any platform or labratory setting appropriately.

Because every application is unique, DMT is accustomed to designing around a wide range of sample sizes, particle sizes, viscosities of sample fluids, and end use applications (e.g. lab counter, automated diagnostic machinery). In fact, a recent competitor comparison of LifeSepTM384S well plates showed that Dexter could achieve approximately 68% faster separation times as shown in Table 1.

Table 1:
Competitor Analysis for Separation Speeds

20 µl of 1:50 Diluted 1.0 µm Beads—Top View		
DMT LifeSep™ 384S	Competitor A	Competitor B
		
Elapsed Time: 3.5 seconds	Elapsed Time: 11.2 seconds	Elapsed Time: 10.7 seconds

DMT continues to advance its technology and leverage customer needs based on what the end user is striving to achieve. Magnetic separation, therefore, continues to improve, but even more, DMT has designed prototypes for a magnetic resuspension device that re-mixes the particles after they have been separated. One of the prototypes is displayed in Fig. 2.

Magnetic resuspension is advantageous over commonly used commercial methods in that it is a no-touch system reducing the possibility of sample contamination or damage. It doesn't introduce heat into the sample, and it can prevent spillage of the sample as the magnets move around the sample container. This also limits the need to move the sample to and from a mixer. Finally, the continuous mixing of the sample creates a more homogenous solution of magnetic particle reagents during processes, rather than allowing the particles to start settling after removing the sample from a mixer.

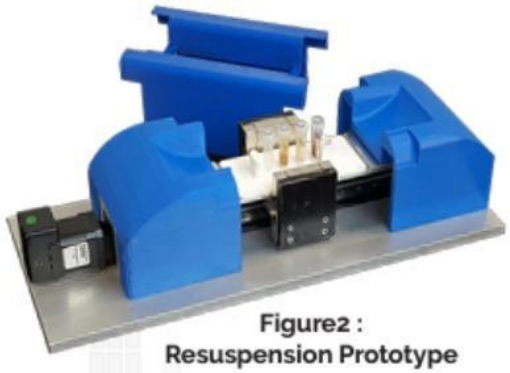

Figure2 :
Resuspension Prototype