example to perform a mixing operation or a 'meniscus scrub' process (referring to the process of passing buffer menisci over magnetically held target cells to achieve high purity).

In accordance with the present disclosure, Applicant has also recognized an imaginative solution to those chamber issues by creating a narrow rectangular-like rigid walled chamber from a flexible bag, e.g., an appropriately sized blood bag. This may be accomplished by confining such a bag between substantially parallel walls and placing the bag under moderate pressure, which forces the walls of the flexible bag into intimate contact with the confining walls and provides a rigid chamber with a wrinkle free collection surface. The need for that flat-wrinkle free surface cannot be over emphasized as magnetic gradients of the type used here fall off sharply as a function of distance from the planar magnets. Wrinkles in such collection surfaces would cause significant target cell losses because their height above a planar magnet array are at diminished magnetic gradients. It should be noted that in addition to employing synchronous pumps to keep collection processing chambers under pressure to create rigid chambers, a simple ballast type auxiliary chamber of appropriate volume filled with pressurized air and fitted with a pressure limit valve can be employed. Large (2L) blood bags fitted with an appropriate limit valves have been employed successfully.

As further disclosed below, Applicant has inventively devised coupling a magnetic assembly with the narrow rectangular-like rigid walled processing chamber in the form of a bag, such as a blood bag, placed between substantially parallel walls and with the bag optionally under moderate pressure. The coupling of the magnetic assembly with the processing chamber in the form of the bag may be permanent with the gradient of magnetic assembly and bag perfectly aligned.

In one aspect, the present disclosure provides a system for magnetic separation of a target bioentity from a fluid suspension of target bioentities and bystander bioentities in a processing chamber, comprising: a platform having a cavity extending therethrough from an upper surface to an opposing lower surface and receiving the processing chamber at the upper surface of the platform, the processing chamber having an opening through which the processing chamber is filled with a cell suspension having magnetized or magnetizable target or bystander bioentities, wherein the processing chamber is a fluid chamber having a collection surface; a magnetic element mounted to the platform within the cavity and movable within the cavity in a perpendicular direction relative to the upper surface of

the platform such that the magnetic element is movable to a position adjacent the upper surface of the platform to be magnetically coupled to the processing chamber to apply a magnetic field to the collection surface to attract magnetized target or bystander bioentities to the collection surface and to a position spaced from the upper surface of the platform so as to not be magnetically coupled to the processing chamber; and a chamber control assembly connected with the processing chamber, platform, and magnetic element operable to pivot the processing chamber, platform, and magnetic element as a single unit through 360° of rotation about an axis such that the processing chamber may be located above the platform or below the platform.

In another aspect, the present disclosure provides a system for magnetic separation of a target bioentity from a fluid suspension of target bioentities and bystander bioentities in a processing chamber, the chamber having an opening through which the chamber can be filled with a cell suspension having magnetized or magnetizable target bioentities or bystander bioentities, wherein the processing chamber is a fluid chamber having a collection surface, the system comprising: a platform having a cavity extending therethrough from an upper surface to an opposing lower surface; a plurality of magnets disposed in the cavity and movable within the cavity relative to the upper surface of the platform, such that the plurality of magnets is magnetically coupled to the processing chamber to apply a magnetic field to the collection surface to attract magnetized target or bystander bioentities to the collection surface and to a position spaced from the upper surface of the platform so as not to be magnetically coupled to the processing chamber; and a chamber control assembly connected with the processing chamber, platform, and plurality of magnets operable to pivot the processing chamber, platform, and plurality of magnets as a single unit through 360° of rotation about an axis such that the processing chamber may be located above the platform or below the platform; wherein the platform includes one or more posts on which the plurality of magnets is movably mounted to permit the magnetic elements to move toward the upper surface of the platform or a spaced distance away from the upper surface.

In another of its examples the present disclosure may provide a device where the i) narrow rectangular-like rigid walled processing chamber in the form of a bag, such as a blood bag, placed between substantially parallel walls and ii) the magnetic assembly can be coupled and uncoupled at will and with the precise alignment required for reproducible processing. Such a configuration presents significant challenges for the following reasons: (1) the processing

chamber is a large thin-walled, narrow rectilinear-like chamber that is operated under pressure that must retain its shape throughout cycles of coupling and uncoupling and (2) magnetic gradients produced by magnetic array fall off rapidly from its planar surface making its proximity to all regions of the collection surface of processing chamber a critical issue. In one of

CLAIMS

What is claimed is:

1. A system for magnetic separation of a target bioentity from a fluid suspension of target bioentities and bystander bioentities in a processing chamber, comprising:

a platform having a cavity extending therethrough from an upper surface to an opposing lower surface and receiving the processing chamber at the upper surface of the platform, the processing chamber having an opening through which the processing chamber is filled with a cell suspension having magnetized or magnetizable target or bystander bioentities, wherein the processing chamber is a fluid chamber having a collection surface;

a magnetic element mounted to the platform within the cavity and movable within the cavity in a perpendicular direction relative to the upper surface of the platform such that the magnetic element is movable to a position adjacent the upper surface of the platform to be magnetically coupled to the processing chamber to apply a magnetic field to the collection surface to attract magnetized target or bystander bioentities to the collection surface and to a position spaced from the upper surface of the platform so as to not be magnetically coupled to the processing chamber; and

a chamber control assembly connected with the processing chamber, platform, and magnetic element operable to pivot the processing chamber, platform, and magnetic element as a single unit through 360° of rotation about an axis such that the processing chamber may be located above the platform or below the platform.

2. The system of claim 1, wherein the platform includes one or more posts on which the magnetic element is movably mounted to permit the magnetic element to move toward the upper surface of the platform or a spaced distance away from the upper surface of the platform.

3. The system of claim 2, wherein magnetic element moves on the one or more posts in response to rotation of the processing chamber, platform, and magnetic element as the single unit about the axis.

4. The system of claim 1, wherein magnetic element is configured to move in response to rotation of the processing chamber, platform, and magnetic element as the single unit about the axis.

5. The system of any one of the preceding claims, wherein the magnetic element comprises an array of magnets.

6. The system of any one of the preceding claims, wherein magnetic element is dimensioned to fit within the cavity.

7. The system of any one of the preceding claims, comprising a plurality of longitudinal non-magnetic bars disposed parallel to one another in spaced apart relation in the cavity.

8. The system of claim 7, wherein a plurality of openings are disposed between respective pairs of the longitudinal non-magnetic bars, and wherein magnetic element includes an array of longitudinally extending magnets dimensioned to fit within respective ones of the plurality of openings when the magnetic element is in the position adjacent to the upper surface of the platform.

9. The system of claim 7 or 8, wherein platform includes a non-magnetic sheet disposed over and in contact with the plurality of longitudinal non-magnetic bars to provide a flat surface for engagement with the processing chamber.

10. The system of any one the preceding claims, comprising a cover disposed over the upper surface to define a space between the cover and upper surface for receiving and retaining the processing chamber.

11. The system of claim 10, comprising a cam in contact with the upper surface and the cover, the cam rotatable to vary a distance between the upper surface and the cover.

12. A system for magnetic separation of a target bioentity from a fluid suspension of target bioentities and bystander bioentities in a processing chamber, the chamber having an opening through which the chamber can be filled with a cell suspension having magnetized or magnetizable target bioentities or bystander bioentities, wherein the processing chamber is a fluid chamber having a collection surface, the system comprising:

a platform having a cavity extending therethrough from an upper surface to an opposing lower surface;

a plurality of magnets disposed in the cavity and movable within the cavity relative to the upper surface of the platform, such that the plurality of magnets is magnetically coupled to the processing chamber to apply a magnetic field to the collection surface to attract magnetized target or bystander bioentities to the collection surface and to a

position spaced from the upper surface of the platform so as not to be magnetically coupled to the processing chamber; and

a chamber control assembly connected with the processing chamber, platform, and plurality of magnets operable to pivot the processing chamber, platform, and plurality of magnets as a single unit through 360° of rotation about an axis such that the processing chamber may be located above the platform or below the platform;

wherein the platform includes one or more posts on which the plurality of magnets is movably mounted to permit the magnetic elements to move toward the upper surface of the platform or a spaced distance away from the upper surface.

13. The system of claim 12, comprising a non-magnetic sheet disposed on the upper surface and in contact with the plurality of longitudinal non-magnetic bars to provide a flat surface for receiving and supporting the processing chamber.