CLAIMS

1. A microfluidic device comprising an enclosure further comprising a flow region and a sequestration pen having a single opening to the flow region, wherein the sequestration pen comprises:

a connection region, an isolation region and a displacement force generation region fluidically connected to the isolation region, wherein the fluidic connection is configured to prevent passage of a micro-object from the isolation region to the displacement force region, wherein:

the connection region comprises a proximal opening to the flow region and a distal opening to the isolation region;

the isolation region comprises at least one fluidic connection to the displacement force generation region, wherein the at least one fluidic connection between the isolation region and the displacement force generation region comprises one or more barrier modules, wherein the one or more barrier modules are configured to prevent passage of the micro-object from the isolation region to the displacement force generation region; and

the displacement force generation region further comprises a thermal target.

2. The microfluidic device of claim 1, wherein the at least one fluidic connection between the isolation region and the displacement force generation region comprises a cross sectional dimension configured to prevent passage of a micro-object from the isolation region to the displacement force generation region.

3. The microfluidic device of claim 1, wherein the enclosure of the microfluidic device further comprises a microfluidic circuit structure that defines, in part, the sequestration pen, and wherein the thermal target is disposed on the microfluidic circuit structure.

4. The microfluidic device of a claim 1, wherein the enclosure of the microfluidic device further comprises a base that defines, in part, the sequestration pen, and wherein the thermal target is disposed on an inner surface of the base.

5. The microfluidic device of claim 1, wherein the thermal target is a sacrificial feature.

6. The microfluidic device of claim 1, wherein the thermal target is positioned in a portion of the displacement force generation region distal to the least one fluidic connection to the

isolation region.

7. A method of dislodging one or more micro-objects within the microfluidic device of any one of claims 1 to 6, the method comprising the steps of:

illuminating a selected discrete region containing or adjacent to one or more micro-objects disposed within a fluidic medium in an enclosure of the microfluidic device, wherein the enclosure comprises a microfluidic circuit comprising a flow region and a substrate;

maintaining the illumination of the selected discrete region of a first period of time sufficient to generate a dislodging force, dislodging the one or more micro-objects from the surface.

8. The method of claim 7, wherein the step of illuminating comprises illuminating the selected discrete region with a laser.

9. The method of claim 7, wherein the enclosure of the microfluidic device comprises at least one sequestration pen.

10. The method of claim 9, wherein the one or more micro-objects are disposed and/or maintained on a surface of the substrate within the at least one sequestration pen.

11. The method of any of claims 7 to 10, wherein the first period of time is in the range of about 10 microsec to about 200 microsec, thereby creating a cavitating force dislodging the one or more micro-objects.

12. The method of any of claims 7 to 11, wherein, when the one or more micro-objects is disposed and/or maintained within at least one sequestration pen within the enclosure, the selected discrete region is a location distal to a proximal opening of the sequestration pen to the flow region or at a central location of the at least one sequestration pen.

13. The method of any of claims 7 to 12, wherein the selected discrete region is a selected point adjacent to the one or more micro-objects.

14. The method of claim 13, wherein the step of illuminating the selected discrete region comprises directing illumination towards the substrate; microfluidic circuit material of a wall; or a thermal target.

15. The method of claim 13, wherein when the one or more micro-objects are

disposed within at least one sequestration pen within the enclosure, the selected discrete region comprises a selected point of microfluidic circuit material that helps to define the at least one sequestration pen.

16. The method of claim 13, wherein the step of illuminating the selected discrete region further comprises heating a first portion of the fluidic medium located within or adjacent to the selected discrete region, thereby creating a cavitating force.

17. The method of claim 13, wherein the method further comprises: heating a first portion of the fluidic medium; and,

creating a persistent gaseous bubble displacing a second portion of the fluidic medium surrounding the one or more micro-object.

18. The method of claim 13, wherein the method further comprises: heating a first portion of the fluidic medium; and

creating one or more gaseous bubbles, thereby creating a shear flow of the fluidic medium towards the one or more micro-objects.

19. The method of claim 13, wherein the method further comprises:

heating a first portion of the fluidic medium;

creating a plurality of gaseous bubbles configured to stream towards the one or more micro-objects; and

contacting the one or more micro-objects with a meniscus of at least one gaseous bubble of the plurality of gaseous bubble.

20. The method of claim 13, wherein when the one or more micro-objects are maintained within at least one sequestration pen within the enclosure, the selected discrete region comprises at least a part of a wall forming a distal end of the sequestration pen, wherein the wall is positioned opposite to a proximal opening to the flow region.

21. The method of claim 13, wherein when the one or more micro-objects are disposed within at least one sequestration pen within the enclosure, the selected discrete region is located in a displacement force generation region of the sequestration pen.

22. The method of claim 21, wherein the one or more micro-objects are disposed within an isolation region of the sequestration pen and the displacement force generation region is fluidically connected to the isolation region.

23. The method of claim 7, further comprising a step of exporting the one or more micro-objects from at least one sequestration pen disposed within the enclosure.

24. The method of claim 23, wherein the step of exporting the one or more micro-objects from the at least one sequestration pen comprises moving the one or more micro-objects with dielectrophoresis force.

25. The method of claim 7, further comprising a step of exporting the one or more micro-objects from the flow region of the enclosure of the microfluidic device.