CLAIMS

WHAT IS CLAIMED IS:

1. A method for providing a first filter element, comprising:
(i) providing a first suspension of a plurality of first microparticles in a first liquid, wherein the first microparticles have a first hydrodynamic diameter of between 1 µm and 1000 µm; and
(ii) applying the first suspension to at least one non-circular opening with a short dimension and a long dimension, wherein the short dimension is less than the hydrodynamic diameter of the first microparticles, and the long dimension is at least 2× the hydrodynamic diameter of the first microparticles, so that the first microparticles accumulate and form a first filter element comprising the first microparticles at the opening,
wherein the applying comprises flowing the first liquid into and through the opening.

2. The method of claims 1, wherein the opening comprises an opening to a conduit leading to a processing system.

3. The method of claim 1 or 2, further comprising:
(iii) dispersing the first filter element formed in step (ii) by: (a) flowing a second liquid out of and through the opening to disperse the first microparticles at the opening, or (b) reversing flow of the first liquid out of and through the opening to disperse the first microparticles at the opening.

4. The method of any of claims 1-3, further comprising forming a second filter element by applying a second suspension of a plurality of second microparticles in a third liquid, wherein the second microparticles have a second hydrodynamic diameter of between 1 µm and 1000 µm, to the at least one opening, wherein the short dimension of the opening is less than the hydrodynamic diameter of the second microparticles, and the long dimension of the opening is at least 2× the hydrodynamic diameter of the second microparticles, to form a second filter element comprising the second microparticles at the opening.

5. The method of claim 4, further comprising dispersing the second filter element by: (a) flowing a fourth liquid out of and through the opening to disperse the second microparticles at the opening, or (b) reversing flow of the third liquid out of and through the opening to disperse the second microparticles at the opening.

6. The method of any of claims 1-5, wherein the first microparticles comprise a surface that adsorbs at least one component of the first liquid.

7. The method of any of claims 1-6, wherein the first microparticles comprise a surface that does not bind nucleic acids.

8. The method of claim 7, wherein the first microparticles comprise a fluorinated surface.

9. The method of claim 2, wherein the conduit comprises a fluorinated surface.

10. The method of claim 2, wherein the first liquid comprises nucleic acid and the processing system comprises a polymerase chain reaction system.

11. The method of any of claims 1-10, wherein the first microparticles are spherical or substantially spherical and the opening has a rectangular or substantially rectangular shape.

12. The method of any of claims 1-11, comprising applying the first suspension of first microparticles to a plurality of openings, wherein the plurality of openings are all non-circular with a short dimension and a long dimension, wherein the short dimension is less than the hydrodynamic diameter of the first microparticles, and the long dimension is at least 2× the hydrodynamic diameter of the first microparticles.

13. The method of any of claims 1-12, wherein the applying comprises flowing the first liquid into and through the opening to form the first filter element that prevents particulate from transiting the first filter element without impeding the flow of the first liquid through the opening.

14. An apparatus comprising:
(i) a plurality of sample containers each of which comprises microparticles and a first liquid in which the microparticles are suspended, wherein the microparticles have a hydrodynamic diameter of between 1 and 1000 μm;
(ii) a conduit having at least one non-circular opening with a short dimension and a long dimension, wherein the short dimension is less than the hydrodynamic diameter of the microparticles, and the long dimension is at least 2× the hydrodynamic diameter of the microparticles;

(iii) a system configured to sequentially immerse the opening or openings of the conduit in the plurality of sample containers;

(iv) a system configured to flow the first liquid through the opening or openings into the conduit, so that the microparticles accumulate and form a filter element comprising the microparticles at the opening or openings of the conduit; and

(v) a system configured to reverse flow of the first liquid through the opening or openings out of the conduit to disperse the microparticles at the opening or openings, or to flow a second liquid through the opening or openings out of the conduit to disperse the microparticles at the opening or openings.

15. The apparatus of claim 14, wherein the microparticles have a diameter in the range of 10 µm to 100 µm.

16. The apparatus of claim 14 or 15, wherein the first liquid is an aqueous liquid.

17. The apparatus of any of claims 14-16, wherein the microparticles are spherical or substantially spherical.

18. The apparatus of any of claims 14-17, further comprising a processing system fluidly connected to the conduit and configured to receive at least a portion of the first liquid.

19. The apparatus of claim 18, wherein the processing system comprises an injector configured to inject the at least portion of the first liquid into the processing system, a droplet generator, a thermal cycler, and/or a detector.

20. The apparatus of claim 18 or claim 19, wherein the processing system comprises a polymerase chain reaction (PCR) system.

21. The apparatus of claim 20, wherein the polymerase chain reaction system comprises a digital PCR system.

22. The apparatus of any of claims 14-21, wherein the sample containers comprise wells of a multi-well plate.

23. The method of claim 10, wherein the polymerase chain reaction system comprises a digital PCR system.