What is claimed is:

Claim 1. A kit, comprising:

a library preparation fluid including library preparation beads, each library preparation bead including:

a first solid support; and

a transposome attached to the first solid support;

a sample fluid including a genomic deoxyribonucleic acid sequence; and

an enrichment fluid including target capture beads, each target capture bead including:

a second solid support; and

capture probes attached to the second solid support, each of the capture probes including a single stranded deoxyribonucleic acid sequence that is complementary to a targeted region of the genomic deoxyribonucleic acid in the sample fluid;

a flow cell, including:

a substrate;

a preparation channel defined at a first region on the substrate, the preparation channel including preparation capture sites to immobilize the library preparation beads;

an enrichment channel defined at a second region on the substrate downstream of the preparation channel, the enrichment channel including:

amplification primers; and

enrichment capture sites to immobilize the target capture beads; and

a transport channel selectively and fluidically connecting the preparation channel and the enrichment channel.

Claim 2. The kit as defined in claim 1, wherein the first solid support and the second solid support are individually selected from the group consisting of a magnetically responsive material, a glass, a polymer, and a metal.

Claim 3. The kit as defined in claim 1 or 2, wherein the capture probes are attached to the second solid support through a binding pair.

Claim 4. The kit as defined in one of claims 1 through 3, further comprising a blocking fluid including blocking deoxyribonucleic acid sequences.

Claim 5. The kit as defined in one of claims 1 through 4, wherein a probe density of the target capture beads ranges from $2*10^5$ capture probes per solid support to $5*10^6$ capture probes per solid support.

Claim 6. A system, comprising:

a substrate;

a preparation channel defined at a first region on the substrate, the preparation channel including preparation capture sites to immobilize library preparation beads;

an enrichment channel defined at a second region on the substrate downstream of the preparation channel, the enrichment channel including:

amplification primers; and

enrichment capture sites to immobilize target capture beads; and

a transport channel selectively and fluidically connecting the preparation channel and the enrichment channel.

Claim 7. The system as defined in claim 6, wherein the preparation channel does not include the amplification primers.

Claim 8. The system as defined in claim 6 or 7, further comprising a second substrate attached to the substrate, wherein the second substrate includes:

a second preparation channel including second preparation capture sites; and

a second enrichment channel including second amplification primers and second enrichment capture sites.

Claim 9. The system as defined one of claims 6 through 8, further comprising a flow cell reagent system in selective fluid communication with the enrichment channel.

Claim 10. The system as defined in claim 9, wherein the reagent system includes:

a reservoir; and

an enrichment fluid contained in the reservoir, the enrichment fluid including target capture beads, each target capture bead including:

a solid support; and

capture probes attached to the solid support, each of the capture probes including a single stranded deoxyribonucleic acid sequence that is complementary to a targeted region of a genomic deoxyribonucleic acid or of a complementary deoxyribonucleic acid.

Claim 11. The system as defined in one of claims 6 through 10, further comprising the target capture beads immobilized at the enrichment capture sites, each target capture bead including:

a solid support; and

capture probes attached to the solid support, each of the capture probes including a single stranded deoxyribonucleic acid sequence that is complementary to a targeted region of a genomic deoxyribonucleic acid or of a complementary deoxyribonucleic acid.

Claim 12. The system as defined in claim 11, wherein the enrichment capture site includes a first member of a binding pair and the solid support is coated with a second member of the binding pair.

Claim 13. The system as defined in one of claims 6 through 12, wherein the enrichment channel includes depressions separated by interstitial regions, and wherein the amplification primers and enrichment capture sites are positioned within each of the depressions.

Claim 14. A flow cell, comprising:

an enrichment channel defined between two surfaces, the enrichment channel, including:

amplification primers attached to at least one of the two surfaces; and

target capture beads immobilized on the at least one of the two surfaces, each target capture bead including:

a solid support; and

capture probes attached to the solid support, each of the capture probes including a single stranded nucleic acid sequence that is complementary to a targeted region of a genomic deoxyribonucleic acid or of a complementary deoxyribonucleic acid.

Claim 15. The flow cell as defined in claim 14, wherein the capture probes are attached to the solid support through a binding pair.

Claim16. The flow cell as defined in claim 14 or 15, wherein each of the two surfaces includes depressions separated by interstitial regions, and wherein the amplification primers and the target capture beads are positioned within each of the depressions.

Claim 17. A method, comprising:

introducing target capture beads into an enrichment channel including at least one surface containing amplification primers and enrichment capture sites, whereby at least some of the target capture beads become immobilized at the enrichment capture sites, each of the target capture beads including:

a solid support; and

capture probes attached to the solid support, each of the capture probes including a single stranded nucleic acid sequence that is complementary to a targeted region of a genomic deoxyribonucleic acid or of a complementary deoxyribonucleic acid.

Claim 18. The method as defined in claim 17, wherein prior to introducing the target capture beads, the method further comprises preparing the target capture beads by:

synthesizing the capture probes with a first member of a binding pair attached to an end of each capture probe; and

incubating the capture probes with the solid support, wherein the solid support is coated with a second member of the binding pair.

Claim 19. The method as defined in claim 18, further comprising controlling a capture probe density of the target capture beads by adjusting a concentration of the capture probes in a mixture used for incubation.

Claim 20. The method as defined in one of claims 17 through 19, further comprising:

preparing library fragments from the genomic deoxyribonucleic acid or the complementary deoxyribonucleic acid;

introducing the library fragments to the enrichment channel; and

incubating the enrichment channel at a predetermined temperature, whereby at least some of the library fragments including the targeted region hybridize to the capture probes.

Claim 21. The method as defined in claim 20, further comprising blocking ends of the library fragments with blocking oligonucleotides prior to introducing the library fragments into the enrichment channel.

Claim 22. The method as defined in claim 20 or 21, further comprising introducing a crowding reagent with the library fragments.

Claim 23. The method as defined in claim 20 or 21, further comprising applying an electric field during the incubation.

Claim 24. The method as defined in claim 20 or 21, further comprising inducing movement of a fluid containing the library fragment during the incubation.

Claim 25. The method as defined in claim 20 or 21, further comprising using electrophoresis to pre-concentrate the library fragments in the enrichment channel.