CLAIMS

1. A method for detecting different analytes, the method comprising:

mixing different analytes with sensing probes, wherein at least some of the sensing probes are specific to respective ones of the analytes;

respectively capturing the analytes by the sensing probes that are specific to those analytes;

respectively coupling fluorophores to sensing probes that captured respective analytes;

mixing the sensing probes with beads, wherein the beads are specific to respective ones of the sensing probes, and wherein the beads include different codes identifying the analytes to which those sensing probes are specific, wherein the different codes comprise oligonucleotides having different sequences than one another;

respectively coupling the sensing probes to beads that are specific to those sensing probes;

identifying the beads that are coupled to the sensing probes that captured analytes using at least fluorescence from the fluorophores coupled to those sensing probes; and

identifying the analytes that are captured by the sensing probes coupled to the identified beads using at least the codes of those beads.

2. The method of claim 1, wherein each of the beads includes a first oligonucleotide having a sequence specific to one of the sensing probes, and wherein each of the sensing probes comprises a second oligonucleotide having a sequence that is complementary to the first oligonucleotide.

3. The method of any one of claims 1 to 2, wherein at least one of the analytes comprises a nucleotide analyte.

4. The method of claim 3, wherein the sensing probe comprises an oligonucleotide sequence specific to hybridize to the nucleotide analyte, optionally:

a) wherein the nucleotide analyte comprises a DNA analyte; or

b) wherein the nucleotide analyte comprises an RNA analyte.

5. The method of any one of claims 1 to 3, wherein at least one of the analytes comprises a non-nucleotide analyte, optionally:

a) wherein the non-nucleotide analyte comprises a protein;

b) wherein the non-nucleotide analyte comprises a metabolite;

c) wherein the sensing probe comprises an antibody selective to the non-nucleotide analyte; or

d) wherein the sensing probe comprises an aptamer selective to the non-nucleotide analyte.

6. The method of any one of claims 1 to 5, wherein the different analytes comprise a plurality of nucleotide analytes and a plurality of non-nucleotide analytes, further comprising at least one of:

(i) wherein the fluorophores are coupled to the sensing probes after the analytes are captured by the sensing probes;

(ii) wherein the fluorophores are coupled to the sensing probes before the sensing probes are coupled to the beads; and

(iii) wherein providing the fluorophores comprises coupling multiple fluorophores to the analytes, optionally wherein coupling multiple fluorophores to the analytes comprises using a hybridization chain reaction (HCR).

7. A system for detecting a plurality of different analytes, the system comprising:

sensing probes that are specific to respective ones of the different analytes;

beads that are specific to respective ones of the sensing probes and that include different codes respectively identifying the analytes to which those sensing probes are specific, wherein the different codes comprise oligonucleotides having different sequences than one another;

fluorophores to respectively couple to sensing probes that capture analytes; and

detection circuitry to identify beads that are coupled to the sensing probes that capture analytes, and to identify the analytes that are captured by the sensing probes coupled to those beads using at least the codes of those beads.

8. The system of claim 7, further comprising at least one of

a) wherein each of the beads includes a first oligonucleotide having a sequence specific to one of the sensing probes, and wherein each of the sensing probes comprises a second oligonucleotide having a sequence that is complementary to the first oligonucleotide; and

b) wherein at least one of the analytes comprises a nucleotide analyte, optionally wherein the sensing probe comprises an oligonucleotide sequence specific to hybridize to the nucleotide analyte, optionally:

i) wherein the nucleotide analyte comprises a DNA analyte; or

ii) wherein the nucleotide analyte comprises an RNA analyte.

9. The system of any one of claims 7 or 8, wherein at least one of the analytes comprises a non-nucleotide analyte, optionally:

i) wherein the non-nucleotide analyte comprises a protein;

ii) wherein the non-nucleotide analyte comprises a metabolite;

iii) wherein the sensing probe comprises an antibody selective to the non-nucleotide analyte;

iv) wherein the sensing probe comprises an aptamer selective to the non-nucleotide analyte;

v) wherein the different analytes comprise a plurality of nucleotide analytes and a plurality of non-nucleotide analytes;

vi) wherein the fluorophores are coupled to the sensing probes after the analytes are captured by the sensing probes;

vii) wherein the fluorophores are coupled to the sensing probes before the sensing probes are coupled to the beads;

viii) wherein the fluorophores are coupled to the sensing probes after the sensing probes are coupled to the beads; or

ix) wherein multiple fluorophores are coupled to the analytes, optionally wherein the multiple fluorophores are coupled to the analytes using a hybridization chain reaction (HCR).