

What is claimed is:

1. A method for identifying target alleles in a mixture of nucleic acids, comprising:
  - (a) contacting an array of features with a plurality of nucleic acid templates, polymerases and nucleotides to form a first plurality of stabilized ternary complexes at a plurality of the features,  
wherein different locus-specific primers are attached at different features of the array,  
wherein each stabilized ternary complex of the first plurality comprises a polymerase, template nucleic acid comprising a target allele of a locus, a locus-specific primer of the array hybridized to the locus, and a next correct nucleotide located at the 3' end of the primer and that is a cognate to the target allele;
  - (b) detecting the first plurality of stabilized ternary complexes at the features;
  - (c) dissociating the next correct nucleotide from each feature of the array after the detecting of the first plurality of stabilized ternary complexes;
  - (d) forming a second plurality of stabilized ternary complexes at the plurality of the features, wherein each stabilized ternary complex of the second plurality comprises the template nucleic acid and the locus-specific primer from the ternary complex that was at the feature, a polymerase and a next correct nucleotide that is a cognate to the target allele of the template nucleic acid; and
  - (e) detecting the second plurality of stabilized ternary complexes at the features, thereby identifying the target alleles.
2. The method of claim 1, wherein the plurality of nucleic acid templates further comprises another allele at the locus.
3. The method of claim 1, wherein the nucleotides comprise exogenous labels, and wherein (b) comprises detecting stabilized ternary complexes at the features by detecting the exogenous labels, thereby identifying the target alleles.
4. The method of any one of claims 1-3, wherein at least two types of nucleotides are contacted with the array in step (a), and wherein different exogenous labels distinguish at least two alleles at each locus in step (b).

5. The method of any one of claims 1-4, wherein in (c) the ternary complex at each of the features of the first plurality of stabilized complexes is converted to a binary complex comprising the polymerase, the template nucleic acid and the locus-specific primer from the ternary complex that was at the feature.
6. The method of claim 5, wherein (c) further comprises dissociating the polymerases from the array after the detecting of the stabilized ternary complexes, whereby the ternary complex at each of the features is converted to a complex comprising the template nucleic acid and the locus-specific primer from the ternary complex that was at the feature.
7. The method of any one of claims 1-6, wherein the polymerases comprise exogenous labels, and wherein (b) comprises detecting stabilized ternary complexes at the features by detecting the exogenous labels, thereby identifying the target alleles.
8. A method for identifying target alleles in a mixture of nucleic acids, comprising:
- (a) contacting an array of features with a plurality of nucleic acid templates, polymerases and nucleotides to form a plurality of stabilized ternary complexes at a plurality of the features,
    - wherein different allele-specific primers are attached at different features of the array,
    - wherein the stabilized ternary complexes each comprises a polymerase, template nucleic acid comprising a target allele of a locus, an allele-specific primer of the array hybridized to the locus, and a next correct nucleotide located at the 3' end of the primer and having a cognate in the locus,
    - wherein the 3' end of the allele-specific primer comprises a cognate nucleotide for the target allele; and
  - (b) detecting stabilized ternary complexes at the features, thereby identifying the target alleles.
9. The method of claim 8, wherein the plurality of nucleic acid templates further comprises a template comprising a second allele at the locus.

10. The method of claim 9, wherein the 3' end of the allele-specific primer does not comprise a cognate nucleotide for the second allele.
11. The method of claim 10, wherein the array further comprises a second allele-specific primer attached at a second feature of the array, wherein the 3' end of the second allele-specific primer comprises a cognate nucleotide for the second allele.
12. The method of any one of claims 8-11, wherein the nucleotides comprise exogenous labels, and wherein (b) comprises detecting stabilized ternary complexes at the features by detecting the exogenous labels, thereby identifying the target alleles.
13. The method of claim 12, wherein at least two types of nucleotides are contacted with the array in step (a), and wherein the at least two types of nucleotides have exogenous labels that are not distinguished from each other in step (b).
14. The method of any one of claims 8-13, further comprising  
(c) dissociating the next correct nucleotide from each feature of the array after the detecting of the stabilized ternary complexes, whereby the ternary complex at each of the features is converted to a binary complex comprising the polymerase, the template nucleic acid and the allele-specific primer from the ternary complex that was at the feature.
15. The method of claim 14, wherein (c) further comprises dissociating the polymerases from the array after the detecting of the stabilized ternary complexes, whereby the ternary complex at each of the features is converted to a complex comprising the template nucleic acid and the allele-specific primer from the ternary complex that was at the feature.
16. The method of claim 15, further comprising:  
(d) forming a second plurality of stabilized ternary complexes at a plurality of the features,  
wherein each of the features comprises the template nucleic acid and the allele-specific primer from the ternary complex that was at the feature, a polymerase and a next correct nucleotide that is a cognate to the target allele of the template nucleic acid; and

(e) detecting stabilized ternary complexes of the second plurality at the features, thereby identifying the target alleles.

17. The method of any one of claims 8-16, wherein the polymerases comprise exogenous labels, and wherein (b) comprises detecting stabilized ternary complexes at the features by detecting the exogenous labels, thereby identifying the target alleles.

18. A method for identifying target alleles in a mixture of nucleic acids, comprising:

(a) contacting an array of features with a plurality of nucleic acid templates, polymerases and nucleotides to form a plurality of stabilized ternary complexes at a plurality of the features,

wherein different locus-specific primers are attached at a first subset of the features of the array, and wherein different allele-specific primers are attached at a second subset of the features of the array,

wherein the stabilized ternary complexes at the first subset of features each comprises a polymerase, template nucleic acid comprising a target allele of a locus, a locus-specific primer of the array hybridized to the locus, and a next correct nucleotide located at the 3' end of the primer and that is a cognate to the target allele,

wherein the stabilized ternary complexes at the second subset of features each comprises a polymerase, template nucleic acid comprising a target allele of a locus, an allele-specific primer of the array hybridized to the locus, and a next correct nucleotide having a cognate in the locus, and

wherein the 3' end of the allele-specific primer comprises a cognate nucleotide for the target allele; and

(b) detecting stabilized ternary complexes at the features, thereby identifying the target alleles.

19. A method for identifying target alleles in a mixture of nucleic acids, comprising:

(a) contacting an array of features with a plurality of primers, polymerases and nucleotides to form a plurality of stabilized ternary complexes at a plurality of the features,

wherein different template nucleic acids are attached at different features of the array,

wherein the stabilized ternary complexes at the features each comprises a polymerase, a template nucleic acid attached to a feature of the array and comprising a target allele of a locus, a primer hybridized to the locus, and a next correct nucleotide located at the 3' end of the primer and having a cognate in the locus,

wherein either

(i) the primer is an allele-specific primer comprising a 3' nucleotide that is a cognate nucleotide for the target allele, or

(ii) the primer is a locus-specific primer and the next correct nucleotide hybridizes to the target allele; and

(b) detecting stabilized ternary complexes at the features, thereby identifying the target alleles.

20. A method for identifying target alleles in a mixture of nucleic acids, comprising:

(a) contacting an array of features with a plurality of primers, template nucleic acids and nucleotides to form a plurality of stabilized ternary complexes at a plurality of the features, wherein polymerases are attached at features of the array,

wherein the stabilized ternary complexes at the features each comprises a polymerase that is attached at a feature of the array, template nucleic acid comprising a target allele of a locus, a primer hybridized to the locus, and a next correct nucleotide located at the 3' end of the primer and having a cognate in the locus,

wherein either

(i) the primer is an allele-specific primer comprising a 3' nucleotide that is a cognate nucleotide for the target allele, or

(ii) the primer is a locus-specific primer and the next correct nucleotide hybridizes to the target allele; and

(b) detecting stabilized ternary complexes at the features, thereby identifying the target alleles.