

not limited to a sample, a reaction mixture, a molecular complex and a substrate. A detection is “quantitative” when it refers, relates to, or involves the measurement of quantity or amount of the target or signal (also referred as quantitation), which includes but is not limited to any analysis designed to determine the amounts or proportions of the target or signal. A detection is “qualitative” when it refers, relates to, or involves identification of a quality or kind of the target or signal in terms of relative abundance to another target or signal, which is not quantified.

[0067] The term “target” or “target molecule” as used herein indicates an analyte of interest. The term “analyte” refers to a substance, compound or component whose presence or absence in a sample has to be detected. Analytes include but are not limited to biomolecules and in particular biomarkers. The term “biomolecule” as used herein indicates a substance compound or component associated to a biological environment including but not limited to sugars, amino acids, peptides proteins, oligonucleotides, polynucleotides, polypeptides, organic molecules, haptens, epitopes, biological cells, parts of biological cells, vitamins, hormones and the like. The term “biomarker” indicates a biomolecule that is associated with a specific state of a biological environment including but not limited to a phase of cellular cycle, health and disease state. The presence, absence, reduction, upregulation of the biomarker is associated with and is indicative of a particular state. Exemplary biomarkers include breast cancer marker HER2, ovarian cancer marker CA125, and heart disease marker thrombin.

[0068] The term “sample” as used herein indicates a limited quantity of something that is indicative of a larger quantity of that something, including but not limited to fluids from a biological environment, specimen, cultures, tissues, commercial recombinant proteins, synthetic compounds or portions thereof.

[0069] In some embodiments, arrays, substrates, methods and systems are herein disclosed for the detection of multiple, distinct targets, such as biomolecules, or a panel of biomarkers. In the arrays, substrates, devices methods and systems herein disclosed each target is detected in a particular location on a surface, and the collection of detected biomolecules forms a pattern, or a barcode. In particular, the arrays, devices, methods and systems herein disclosed can apply to the detection of the biomarker panel within a micro fluidics environment.

[0070] In some embodiments of the arrays, substrates devices methods and systems herein disclosed a plurality of capture agents attached to a substrate.

[0071] The wording “capture agents” as used herein indicate a molecule capable of specific binding with a predetermined binding. Exemplary capture agents include but are not limited to polynucleotides and proteins, and in particular antibodies.

[0072] The term “polynucleotide” as used herein indicates an organic polymer composed of two or more monomers including nucleotides, nucleosides or analogs thereof. The term “nucleotide” refers to any of several compounds that consist of a ribose or deoxyribose sugar, joined to a purine or pyrimidine base and to a phosphate group and that are the basic structural units of nucleic acids. The term “nucleoside” refers to a compound (as guanosine or adenosine) that consists of a purine or pyrimidine base combined with deoxyribose or ribose and is found especially in nucleic acids. The term “nucleotide analog” or “nucleoside analog” refers

respectively to a nucleotide or nucleoside in which one or more individual atoms have been replaced with a different atom or a with a different functional group. Accordingly, the term polynucleotide includes nucleic acids of any length DNA RNA analogs and fragments thereof. A polynucleotide of three or more nucleotides is also called nucleotidic oligomers or oligonucleotide.

[0073] The term “polypeptide” as used herein indicates an organic polymer composed of two or more amino acid monomers and/or analogs thereof. The term “polypeptide” includes amino acid polymers of any length including full length proteins and peptides, as well as analogs and fragments thereof. A polypeptide of three or more amino acids is also called a protein oligomer or oligopeptide. As used herein the term “amino acid”, “amino acidic monomer”, or “amino acid residue” refers to any of the twenty naturally occurring amino acids including synthetic amino acids with unnatural side chains and including both D and L optical isomers. The term “amino acid analog” refers to an amino acid in which one or more individual atoms have been replaced, either with a different atom, isotope, or with a different functional group but is otherwise identical to its natural amino acid analog.

[0074] The term “protein” as used herein indicates a polypeptide with a particular secondary and tertiary structure that can participate in, but not limited to, interactions with other biomolecules including other proteins, DNA, RNA, lipids, metabolites, hormones, chemokines, and small molecules.

[0075] The term “antibody” as used herein refers to a protein that is produced by activated B cells after stimulation by an antigen and binds specifically to the antigen promoting an immune response in biological systems and that typically consists of four subunits including two heavy chains and two light chains. The term antibody includes natural and synthetic antibodies, including but not limited to monoclonal antibodies, polyclonal antibodies or fragments thereof. Exemplary antibodies include IgA, IgD, IgG1, IgG2, IgG3, IgM and the like. Exemplary fragments include Fab Fv, Fab' F(ab')₂ and the like. A monoclonal antibody is an antibody that specifically binds to and is thereby defined as complementary to a single particular spatial and polar organization of another biomolecule which is termed an “epitope”. A polyclonal antibody refers to a mixture of monoclonal antibodies with each monoclonal antibody binding to a different antigenic epitope. Antibodies can be prepared by techniques that are well known in the art, such as immunization of a host and collection of sera (polyclonal) or by preparing continuous hybridoma cell lines and collecting the secreted protein (monoclonal).

[0076] The wording “specific” “specifically” or “specificity” as used herein with reference to the binding of a molecule to another refers to the recognition, contact and formation of a stable complex between the molecule and the another, together with substantially less to no recognition, contact and formation of a stable complex between each of the molecule and the another with other molecules. Exemplary specific bindings are antibody-antigen interaction, cellular receptor-ligand interactions, polynucleotide hybridization, enzyme substrate interactions etc. The term “specific” as used herein with reference to a molecular component of a complex, refers to the unique association of that component to the specific complex which the component is part of. The term “specific” as used herein with reference to a sequence of a polynucleotide refers to the unique association of the sequence with a single polynucleotide which is the complementary sequence.