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group consisting of single stranded DNA, single stranded PNA, single stranded DNA covalently bound to a molecular species having an electrophoretic mobility substantially different from the electrophoretic mobility of single stranded DNA, nucleic acid aptamers, antibodies, molecules with molecular weight less than 500 amu, amino acids, peptides, proteins, cytokines, nucleic acids, lectins, and carbohydrates.

25. A method for determining the melting temperature of a duplex of a first molecular species and a second molecular species in a fluid, said method comprising the steps of:

mixing a first molecular species and a second molecular species in a fluid to form a sample solution containing a duplex;

applying an electric field to said fluid thereby causing said duplex to move electrophoretically with an electrophoretic velocity;

establishing a temperature gradient in said fluid having a significant component substantially aligned with the electrophoretic motion of said duplex, thereby generating a gradient of the electrophoretic velocity of said duplex;

producing a flow of said fluid having a significant component substantially aligned in a direction opposite a direction of said electrophoretic motion of said duplex;

wherein magnitudes of said electric field, said temperature gradient, and said flow are such that said duplex will accumulate or be focused at a first position along said temperature gradient, a local temperature around said first position being at a first temperature;

detecting a focused band of said duplex at said first position, thereby determining an amount of said duplex in said focused band at said first temperature;

progressively changing at least one of the group consisting of said electric field, said temperature gradient, and said flow, so that a local temperature around said focused band becomes progressively different than said first temperature;

monitoring the amount of said duplex in said focused band; and

comparing the amount of said duplex in said focused band at each progressively different temperature, thereby determining the melting temperature of the duplex.

26. The method of claim 25, wherein an ionic strength of said fluid is temperature dependent and said temperature gradient establishes a gradient in the ionic strength of said fluid.

27. The method of claim 26, wherein said first molecular species is selected from the group consisting of single stranded DNA, single stranded PNA, single stranded DNA covalently bound to a molecular species having an electrophoretic mobility substantially different from the electrophoretic mobility of single stranded DNA, nucleic acid aptamers, antibodies, molecules with molecular weight less than 500 amu, amino acids, peptides, proteins, cytokines,

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nucleic acids, lectins, and carbohydrates; and said second molecular species is selected from the group consisting of single stranded DNA, single stranded PNA, single stranded DNA covalently bound to a molecular species having an electrophoretic mobility substantially different from the electrophoretic mobility of single stranded DNA, nucleic acid aptamers, antibodies, molecules with molecular weight less than 500 amu, amino acids, peptides, proteins, cytokines, nucleic acids, lectins, and carbohydrates.

28. A method for using a temperature gradient focusing device to determine the melting temperature of a duplex of a first molecular species and a second molecular species in a fluid, said temperature gradient focusing device having a temperature gradient, said method comprising the steps of:

mixing a first molecular species and a second molecular species in a fluid to form a sample solution containing a duplex;

introducing said sample solution into said temperature gradient focusing device;

adjusting operational parameters of said temperature gradient focusing device so that said duplex is focused at a first position along said temperature gradient, a local temperature around said first position being at a first temperature;

detecting the focused band of said duplex at said first position, thereby determining the amount of said duplex in said focused band at said first temperature;

progressively changing said operational parameters so that the local temperature around said focused band becomes progressively different than said first temperature;

monitoring the amount of said duplex in said focused band; and

comparing the amount of said duplex in said focused band at each progressively different temperature, thereby determining the melting temperature of the duplex.

29. The method of claim 28, wherein said first molecular species is selected from the group consisting of single stranded DNA, single stranded PNA, single stranded DNA covalently bound to a molecular species having an electrophoretic mobility substantially different from the electrophoretic mobility of single stranded DNA, nucleic acid aptamers, antibodies, molecules with molecular weight less than 500 amu, amino acids, peptides, proteins, cytokines, and nucleic acids; and said second molecular species is selected from the group consisting of single stranded DNA, single stranded PNA, single stranded DNA covalently bound to a molecular species having an electrophoretic mobility substantially different from the electrophoretic mobility of single stranded DNA, nucleic acid aptamers, antibodies, molecules with molecular weight less than 500 amu, amino acids, peptides, proteins, cytokines, and nucleic acids.

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