Table S1. Summary of logic gates based on aptamers.

Inputs (solid - targets for aptamers)	Logic gates	Aptameric strategy	Output signal	The operation time (from the moment of entering the input data to the moment of receiving the output signal), minutes	Reference
Optical signal					
Fluorescent output in solution					
Thrombin Adenosine	iORi iANDi	The use of bifunctional aptamer; switching of an aptamer from dsDNA to a complex with a target	Fluorescence (fluorescein)	30	[1]
Guanidinium chloride prion PrP^{c} prion PrP^{rev}	iXORi iORi	Formation of a complex of an aptamer with a target	Fluorescence (quantum dots)	100	[2]
PDGF-BB Hemin	iANDi	The use of bifunctional aptamer; switching of an aptamer from hairpin DNA to a complex with a target	Fluorescence (silver nanoclusters)	120	[3]
ATP VEGF	iANDi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (Texas Red, tetramethylrhodamine)	50	[4]
The colorimetric output in the solution due to the catalytic labels					
AMP cocaine	iORi iANDi iXORi	Switching of an aptamer from dsDNA to a complex with a target	Colorimetric reaction of the hemin-containing DNAzyme	22	[5]
AMP cocaine	iORi	The use of bifunctional aptamer; switching of an aptamer from dsDNA to a complex with a target	Colorimetric reaction of the hemin-containing DNAzyme	62	[6]
Logic gates based on covalently modified gold nanoparticles					
Hg^{2+} ions *ssDNA*	iANDi iORi iAND/ORi iNOTi	Formation of a complex of an aptamer with a target	Colorimetric signal from aggregation of AuNPs (SPR)	180	[7]
Adenosine *ssDNA*	iXORi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (Cy5)	Not defined	[8]

Adenosine Cocaine K^+ ions	iANDi iORi	The use of bifunctional aptamer, switching of an aptamer from dsDNA to a complex with a target	Colorimetric signal from deaggregation of AuNPs (SPR)	5	[9]
VEGF PDGF	iANDi iORi	Switching of an aptamer from dsDNA to a complex with a target	OR: fluorescence (TAMRA, FITC) AND: colorimetric signal from aggregation of AuNPs (SPR)	120	[10]
ATP *ssDNA*	iANDiANDi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (FAM)	17	[11]
Lateral flow strip biosensors					
ATP Thrombine	iORi iANDi	The use of a hybrid DNA based on cleaved and combined parts of aptamers; the use of split aptamers into two parts	Colorimetric signal from retaining of AuNPs (SPR)	45	[12]
Carcinoembryonic antigen (CEA) *Aptamer against CEA* *ssDNA*	iORi iINHIBITi	Switching of an aptamer from hairpin DNA to a complex with a target	Colorimetric signal from retaining of AuNPs (SPR)	50 (OR) 80 (INHIBIT)	[13]
Thrombin Mucin I Carcinoembryonic antigen (CEA) *Modified AuNPs* *Aptamer against thrombin* *Aptamer against mucin I* *Aptamer against CEA*	iORi iANDi iINHIBITi iNANDi iANDiORi iANDiINHIBITi iORiINHIBITi iINHIBITiNANDi iANDiORiINHIBITi iANDiINHIBITiNANDi iORiINHIBITiNANDi iANDiORiINHIBITiNANDi keypad-lock system	Switching of an aptamer from hairpin DNA to a complex with a target; sandwich scheme (one target vs. two aptamers)	Colorimetric signal from retaining of AuNPs (SPR)	730	[14]
Mesoporous silicon					
Cocaine Adenosine K+ ions	iORi iANDi	Switching of an aptamer from dsDNA to a complex with a target	Luminescence (rhodamine B)	70	[15]

Temperature					
Logic gates based on unmodified gold nanoparticles					
Adenosine Cocaine	iANDi iORi	The use of a hybrid DNA based on cleaved and combined parts of aptamers	Colorimetric signal from aggregation of AuNPs (SPR)	10	[16]
Bisphenol A Bisphenol S Aptamer against bisphenol A	iIMPLY1i iIMPLY2i iIMPLY1iIMPLY2i iORi	Formation of a complex of an aptamer with a target	Colorimetric signal from aggregation of AuNPs (SPR)	18	[17]
D-arginine vasopressin *Aptamer against D-arginine vasopressin*	iINHIBITi	Formation of a complex of an aptamer with a target	Colorimetric signal from aggregation of AuNPs (SPR)	40	[18]
D-arginin L-arginin	iORi	Formation of a complex of an aptamer with a target	Colorimetric signal from aggregation of AuNPs (SPR)	45	[19]
Hydrogels					
ATP cocaine	iORi iANDi	The use of a bifunctional aptamer; switching of an aptamer from dsDNA to a complex with a target	Colorimetric signal from release of AuNPs (SPR)	25	[20]
Hg^{2+} ions Ag^{+} ions	iORi iANDi	Formation of a complex of an aptamer with a target	Colorimetric signal from SiNPs (structural color)	Not defined	[21]
Logical gates based on graphene oxide					
ATP Thrombin *Aptamer against thrombin* *Aptamer against ATP*	iINHIBITi iORi	Switching of an aptamer from grapheme surface to a complex with a target	Fluorescence (FAM)	30	[22]
ATP Thrombin	iANDi	Formation of a complex of an aptamer with a target	Fluorescence (FAM, ROX)	150 (time of fluorescence recording)	[23]
Thrombin PDGF-BB *ssDNA*	iORi iINHIBITi	Switching of an aptamer from grapheme surface to a complex with a target; sandwich scheme (one target vs. two aptamers)	Colorimetric signal from gemin-containing graphene	102	[24]
ATP Thrombin	half-adder half-substractor	Switching of an aptamer from grapheme surface to a	Fluorescence (QD_{506} и QD_{571})	40	[25]

Aptamer against thrombin *Aptamer against ATP*		complex with a target			
ATP ssDNA	iANDi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (PicoGreen dye for dsDNA)	180	[26]
Elecrtochemical detection					
Two-/three electrode cells					
Electroactive compounds					
Cocaine *ssDNA*	iXORi	Formation of a complex of an aptamer with a target	Change in the reduction current (methylene blue)	Not defined	[27]
ATP *Adenosine deaminase* $K_3[Fe(CN)_6]$ K_2IrCl_6	iINHIBITi iINHIBITiANDi iINHIBITiANDiXORi	The use of split aptamer into two parts	Change in the current (ferrocene)	>30	[28]
Thrombin Lysozyme	iNANDi	Switching of an aptamer from graphene electrode surface to a complex with a target; the use of bifunctional aptamer	Change in the current ($[Ru(NH_3)_6]^{3+}$)	60	[29]
Catalytic label					
Kanamycin Oxytetracycline *Aptamer against kanamycin* *Aptamer against oxytetracycline*	iORi iINHIBITi	The use of bifunctional aptamer	Chronopotentiometric detection (hemin-containing DNAzyme reaction)	60	[30]
Thrombin ATP	iORi iANDi iNORi iNANDi	The use of a hybrid DNA based on cleaved and combined parts of aptamers; The use of split aptamer into two parts; switching of an aptamer from dsDNA to a complex with a target	Reduction current (HRP)	88	[31]
Biofuel cells					
Thrombin Lysozyme	iNANDi	Formation of a complex of an aptamer with a target	Open circuit voltage	Not defined	[32]
Thrombin	ON-OFF	The use of bifunctional	Current density on the	120	[33]

ATP	RESET	aptamer; switching of an aptamer from dsDNA to a complex with a target	cathode		
ATP *Adenosine deaminase*	iINHIBITi	Switching of an aptamer from hairpin DNA to a complex with a target	Cathode current	120	[34]
		Other			
ATP *ssDNA*	IMPLICATION (if..then) ON-OFF	Switching of an aptamer from dsDNA to a complex with a target	Ion current	500 (ON/OFF) 100 (OFF/ON).	[35]
		Cell-based logic gates			
Membrane targets for aptamers sgc8c, TD05, sgc4f, TE17, TE02	i1ANDi2 i1ORi2 i1NOTi2 i1ANDNOTi2 i1ANDi2ANDi3 i1AND(i2ORi3) i1ANDNOT(i2ORi3) i1ANDi2ANDNOTi3 i1ANDi2ANDi3ANDi4 i1ANDi2ANDi3ANDNOTi4	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (cytometry), assessment of cell viability (propidium iodide)	>90	[36]
Membrane targets for aptamers sgc8c sgc4f TC01	iANDi iINHIBITi iANDiANDi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (cytometry), assessment of cell viability (propidium iodide)	>90	[37]
Membrane targets for aptamers sgc8c TD05	iORi iANDi	Formation of a complex of an aptamer with a target	The change of resistance between electrodes	Not defined	[38]
Membrane targets for aptamers sgc8c sgc4f	iANDi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (cytometry)	60-240	[39]
Membrane targets for aptamers sgc8c sgc4f TC01	iANDi	Formation of a complex of an aptamer with a target	Fluorescence (cytometry)	150	[40]
		Logic gates based on DNA origami			
Membrane targets for	iANDi	Switching of an aptamer from	Fluorescence	>300	[41]

aptamers 41t TE17 sgc8c		dsDNA to a complex with a target	(cytometry)		
Membrane targets for aptamers PDGF VEGF	iANDi iORi iXORi iNANDi iNOTi iCNOTi	Switching of an aptamer from dsDNA to a complex with a target	Fluorescence (cytometry)	Several hours	[42]
ATP Cocaine	YES iORi iANDi	Switching of an aptamer from dsDNA to a complex with a target; formation of a complex of an aptamer with a target	Atomic force microscopy, fluorescence (cleaving DNAzyme)	500	[43]
ATP Cocaine	Conditionally iORi iANDi	Switching of an aptamer from dsDNA to a complex with a target	Atomic force microscopy, PAGE electrophoresis	120	[44]

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