

FIG. 1A

GAGGTGCAGCTGTTGGAGTCTGGGGGAGGCTTGGTACAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGCCTCTGGATT
E V Q L L E S G G L V Q P G S L R L S C A A S G F
CACCTTAGCAGCTATGCCATAGCTGGGTCGCCAGGCTCCAGGAAGGGCTGGAGTGGTCTCAGCTATTAGTGTA
VH CDR1
T F S S Y A Y S W V R Q A P G K G L E W V S A I S G
GTGGTGTAGAACATACTACGCAGACTCCGTGAAGGGCCGGTTCACCATCTCCAGAGACAAATCCAAGAACACGCTGTAT
VH CDR2
S G G R T Y Y A D S V K G R F T I S R D N S K N T L Y
CTGCAATGAACAGCCTGAGAGCCGAGACACGGCCGTGTATTACTGTGCGAGATTAGGTATGGCGGGTGGACGAGTG
VH CDR3
L Q M N S L R A E D T A V Y Y C A R L G Y G R V D E W
GGCAGGGGAACCTGGTCACCGTCTCGAGT
G R G T L V T V S S

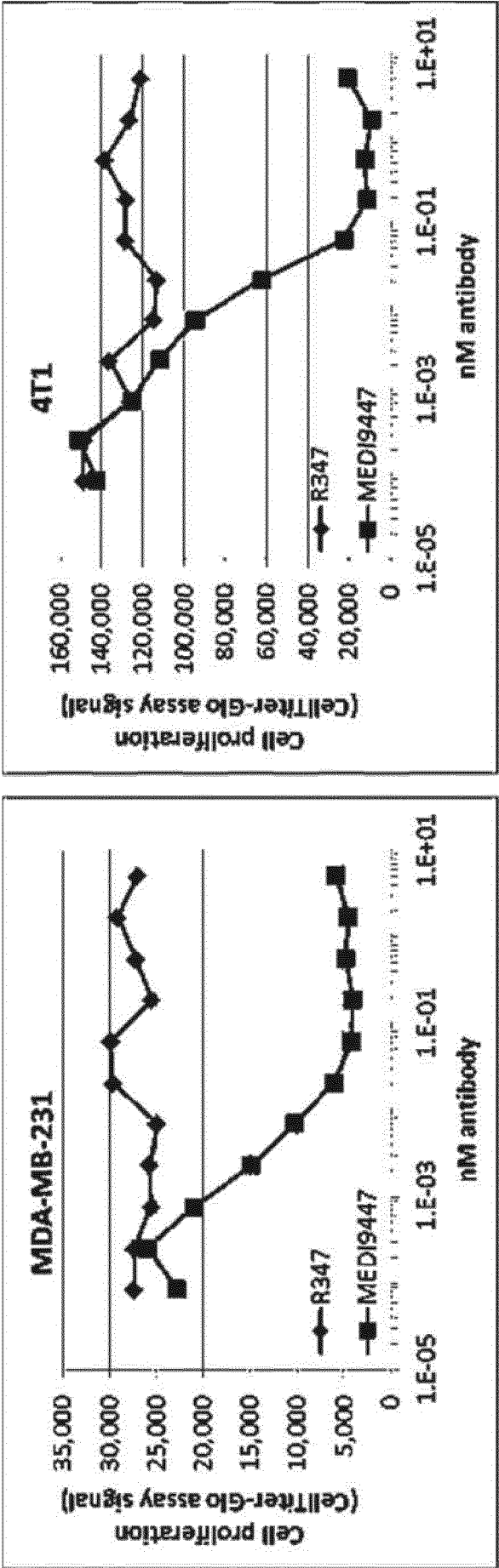
SUBSTITUTE SHEET (RULE 26)

	* * * * *																																			CDR 1									
Kabat position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	a	b	c	d						
IGHV3-23*01 / IGHJ2*01	E	V	Q	L	L	E	S	G	G	L	V	Q	P	G	G	S	L	R	L	S	C	A	S	G	F	T	F	S	S	Y	A	M	S	-	-	-	-	-	-						
MEDI9447 VH	E	V	Q	L	L	E	S	G	G	L	V	Q	P	G	G	S	L	R	L	S	C	A	S	G	F	T	F	S	S	Y	A	M	S	-	-	-	-	-	-						
	* * * * *																																			CDR 2					* * * *				
Kabat position:	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	a	b	c	d	e	f	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68						
IGHV3-23*01 / IGHJ2*01	W	V	R	Q	A	P	G	K	G	L	E	W	V	S	A	I	S	G	-	-	-	-	-	-	S	G	G	S	T	Y	A	D	S	V	K	G	R	F	T						
MEDI9447 VH	W	V	R	Q	A	P	G	K	G	L	E	W	V	S	A	I	S	G	-	-	-	-	-	-	S	G	G	R	T	Y	A	D	S	V	K	G	R	F	T						
	* * * *																																			CDR 3					* * * *				
Kabat position:	69	70	71	72	73	74	75	76	77	78	79	80	81	82	a	b	c	d	e	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	a	b						
IGHV3-23*01 / IGHJ2*01	I	S	R	D	N	S	K	N	T	L	Y	L	Q	M	N	S	L	-	-	R	A	E	D	T	A	V	Y	Y	C	A	K	.	.	Y	W	Y	F	-	-						
MEDI9447 VH	I	S	R	D	N	S	K	N	T	L	Y	L	Q	M	N	S	L	-	-	R	A	E	D	T	A	V	Y	C	A	R	L	G	Y	G	R	V	-	-							
	* * * * *																																			CDR 4					* * * *				
Kabat position:	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	101	102	103	104	105	106	107	108	109	110	111	112	113																	
IGHV3-23*01 / IGHJ2*01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D	L	W	G	R	G	T	L	V	T	V	S	S																
MEDI9447 VH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D	E	W	G	R	G	T	L	V	T	V	S	S																

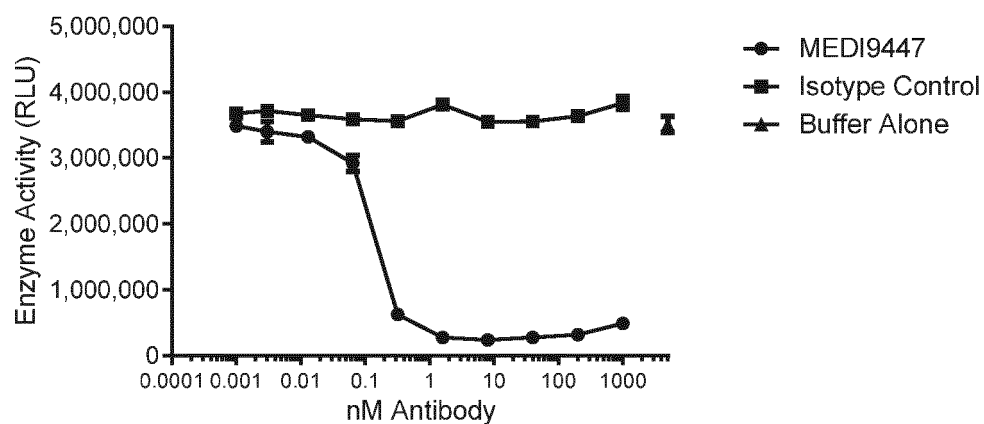
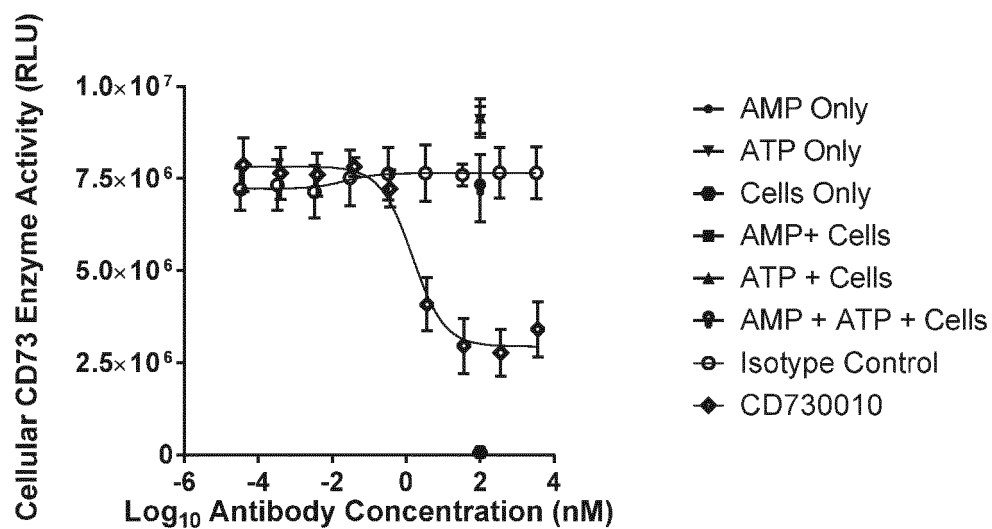
FIG. 1D

	CDR 1																																											
Kabat position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	a	b	c	d	e	f	g	h	28	29	30	31	32	33	34		
IGLV1-44*01 / IGLJ3*01	Q	S	V	L	T	Q	P	P	S	-	A	S	G	T	P	G	Q	R	V	T	I	S	C	S	G	S	S	N	-	-	-	-	-	-	-	-	-	I	G	S	N	T	V	N
MEDI9447 VL	Q	S	V	L	T	Q	P	P	S	-	A	S	G	T	P	G	Q	R	V	T	I	S	C	S	G	S	L	S	N	-	-	-	-	-	-	-	-	I	G	R	N	P	V	N
	CDR 2																																											
Kabat position:	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	a	b	c	d	e	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	a	b	69		
IGLV1-44*01 / IGLJ3*01	W	Y	Q	Q	L	P	G	T	A	P	K	L	L	I	Y	S	N	-	-	-	-	-	N	Q	R	P	S	G	V	P	D	R	F	S	G	S	K	S	G	-	-	T		
MEDI9447 VL	W	Y	Q	Q	L	P	G	T	A	P	K	L	L	I	Y	L	D	-	-	-	-	-	N	L	R	L	S	G	V	P	D	R	F	S	G	S	K	S	G	-	-	T		
	CDR 3																																											
Kabat position:	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	a	b	c	d	e	f	g	h	i	96	97	98	99	100	101	102		
IGLV1-44*01 / IGLJ3*01	S	A	S	L	A	I	S	G	L	Q	S	E	D	E	A	D	Y	Y	C	A	A	W	D	D	S	L	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MEDI9447 VL	S	A	S	L	A	I	S	G	L	Q	S	E	D	E	A	D	Y	Y	C	A	T	W	D	D	S	H	P	G	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Kabat position:	103	104	105	106	a	b	c	107																																				
IGLV1-44*01 / IGLJ3*01	K	L	T	V	-	-	-	L																																				
MEDI9447 VL	K	L	T	V	-	-	-	L																																				

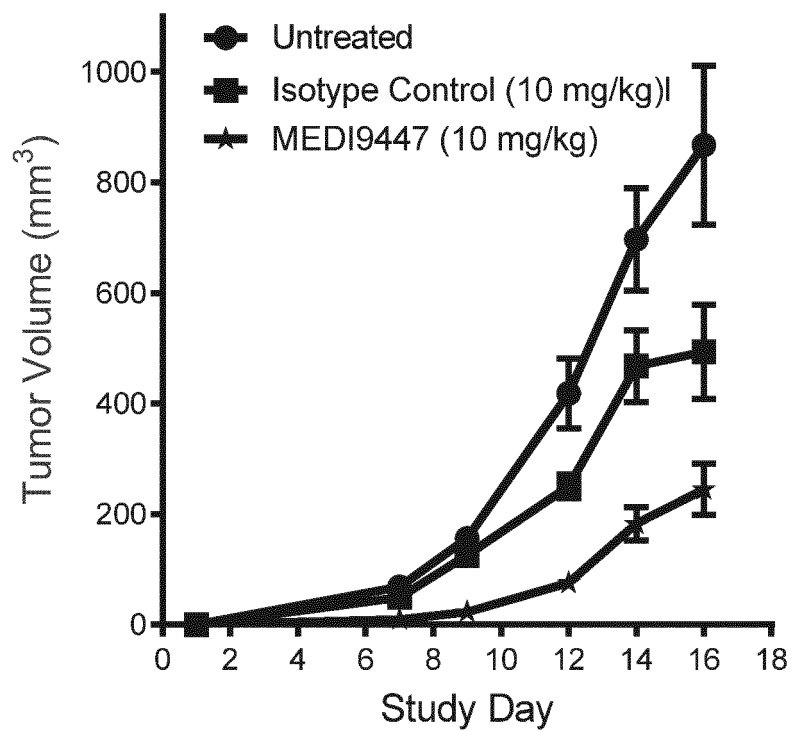
FIG. 2: Antibody-mediated Internalization of Cytotoxic FabZAP Reagent into MDA-MB-231 Cells and 4T1 Cells



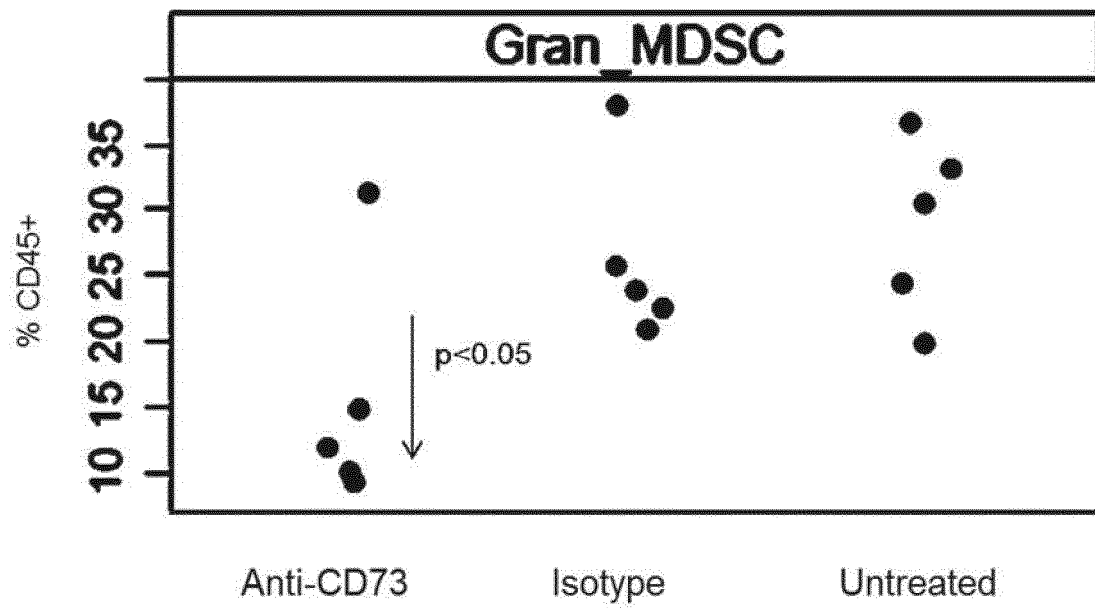
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FIG. 3A : Inhibition of 5' ectonucleotidase by an Anti-CD73 Antibody**FIG. 3B** Inhibition of AMP hydrolysis by an Anti-CD73 Antibody

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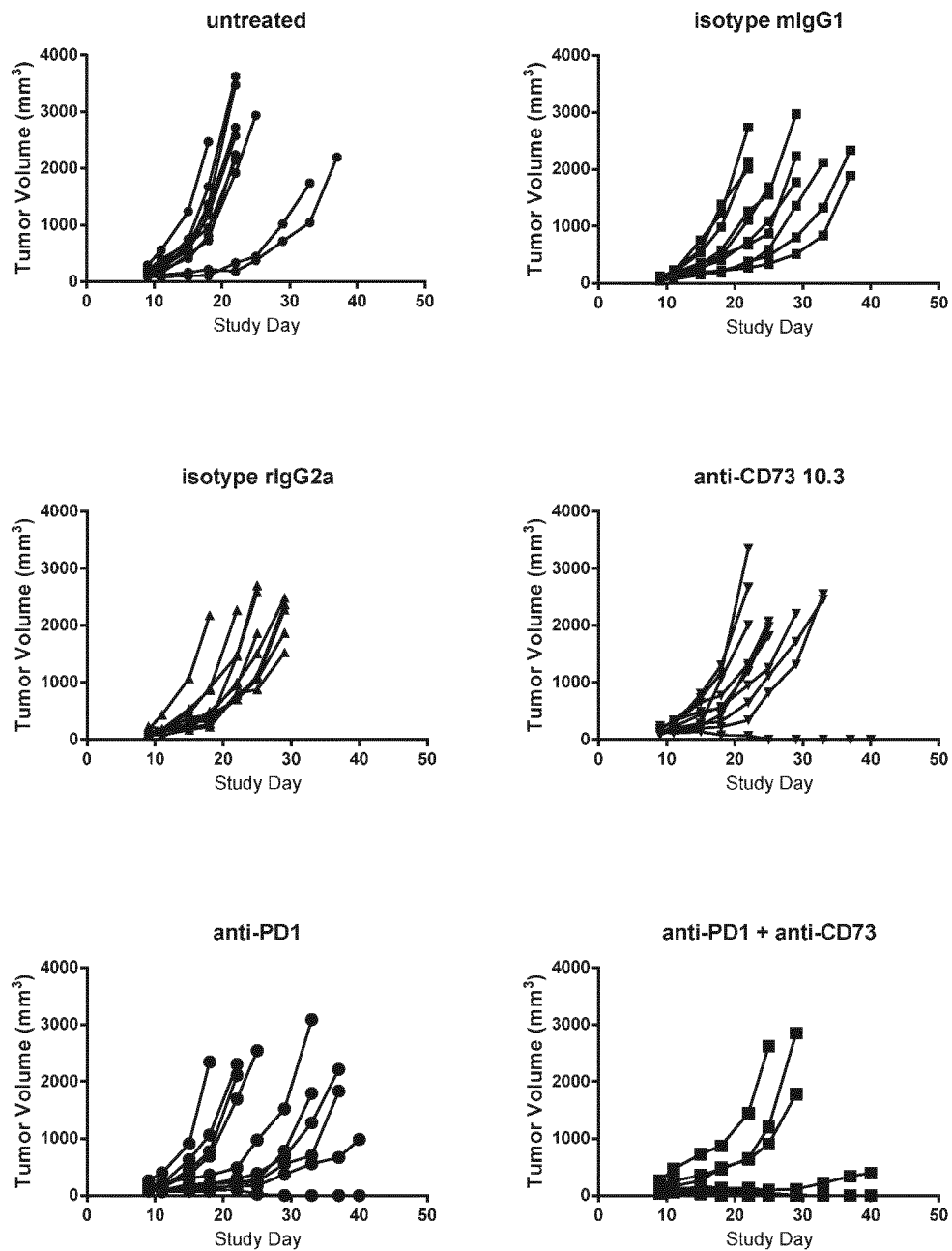
FIG. 4: MEDI9447 Inhibited Tumor Growth

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FIG. 5 MEDI9447 Inhibited Tumor-infiltrating MDSCs

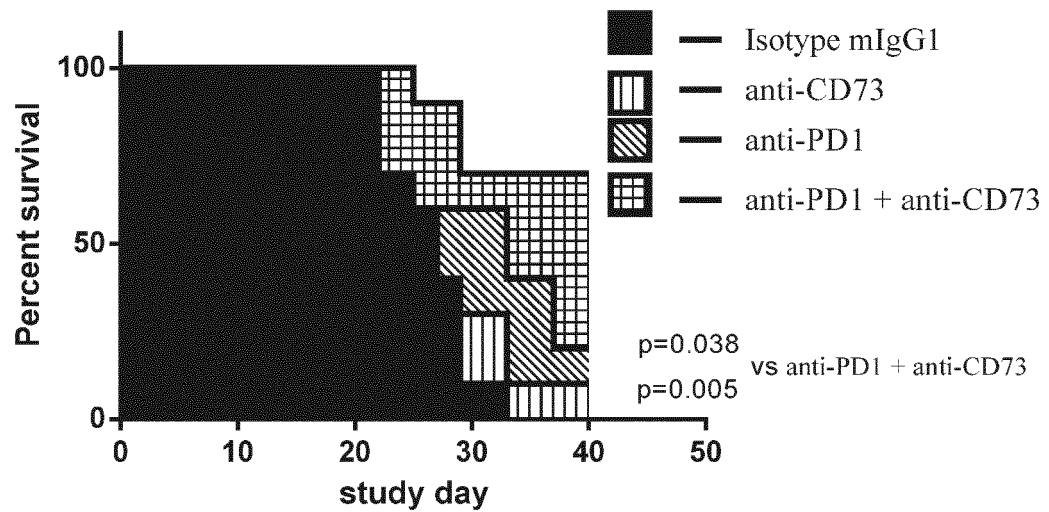
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FIG. 6



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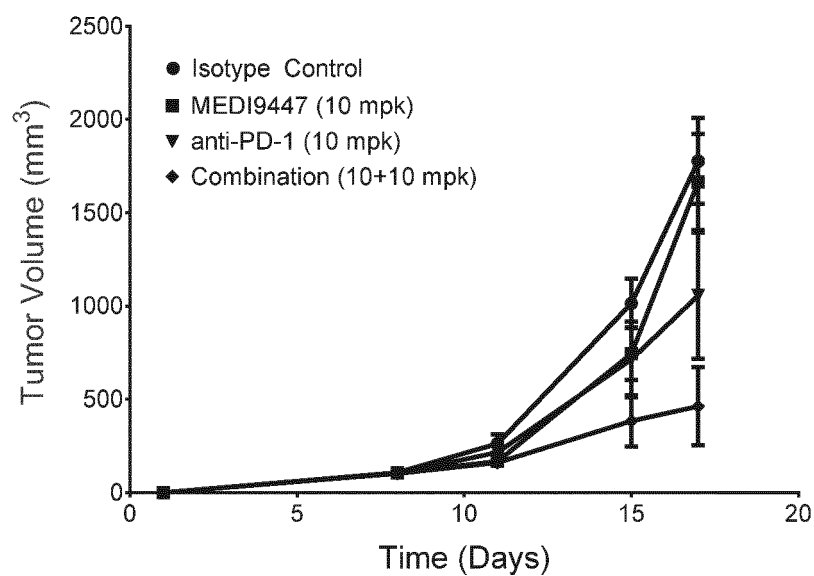
FIG. 7



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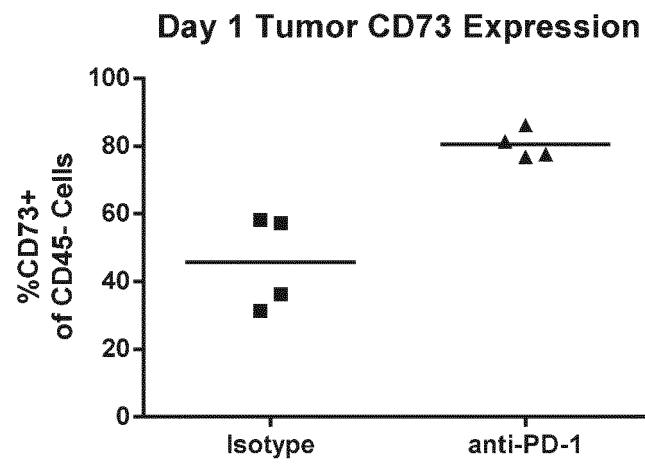
FIG. 8

Mouse Colorectal Tumors Treated With a Combination of anti-PD-1 and MEDI9447



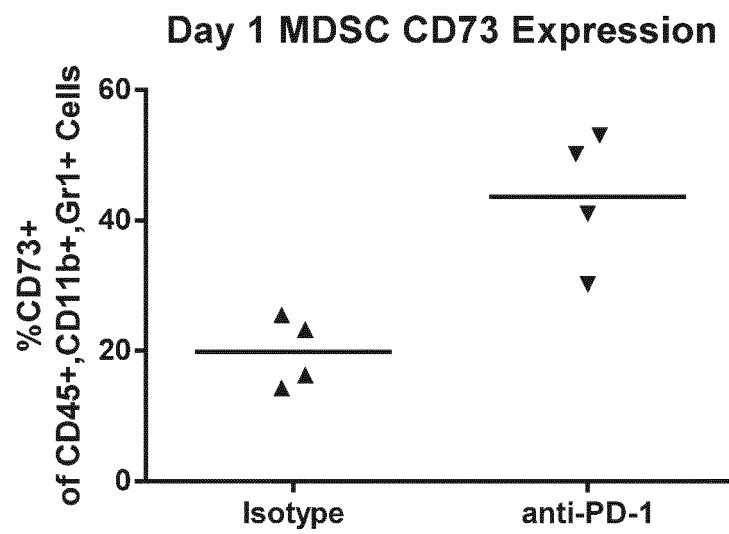
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FIG. 9



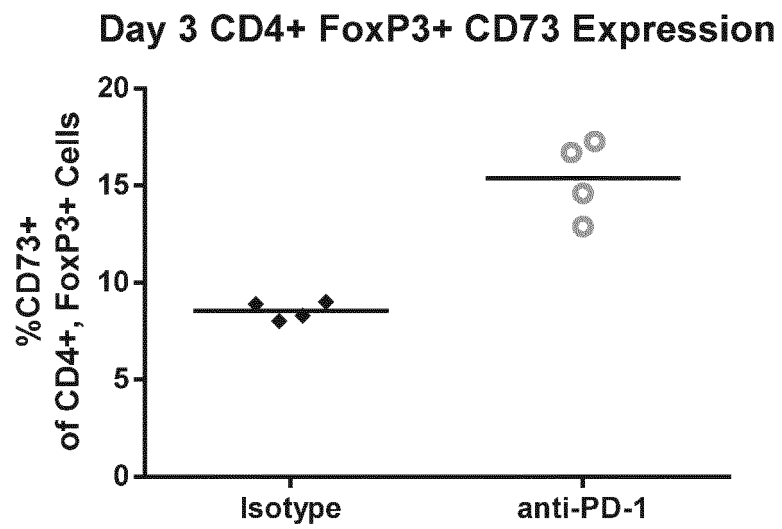
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FIG. 10



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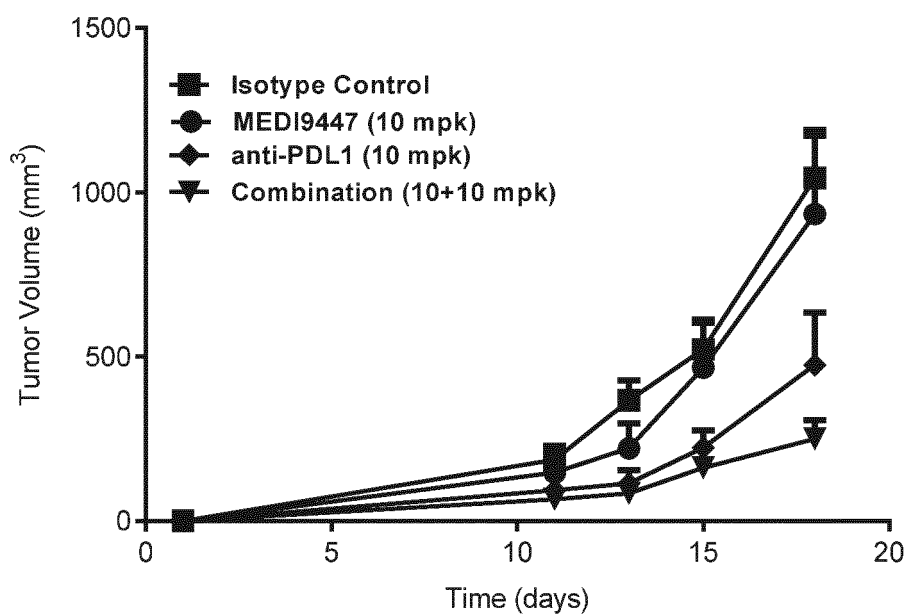
FIG. 11



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FIG. 12

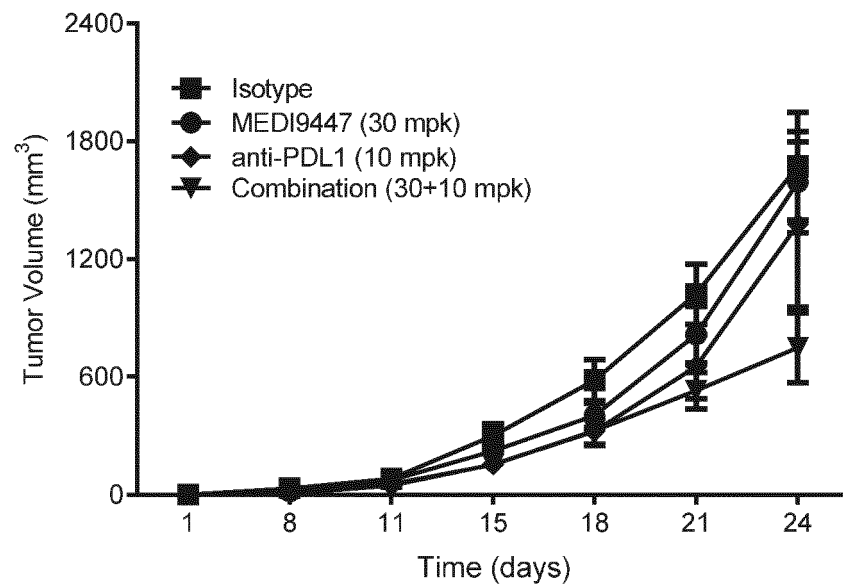
Mouse Melanoma Tumors Treated With a Combination of anti-PD-L1 and MEDI9447



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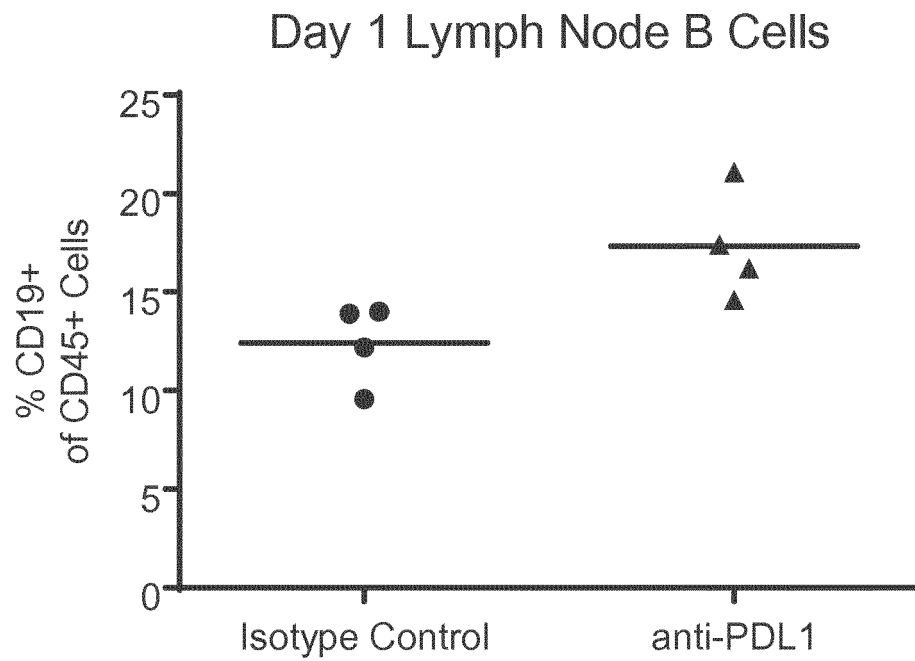
FIG. 13

Mouse Lymphoma Treated With a Combination of anti-PD-L1 and MEDI9447



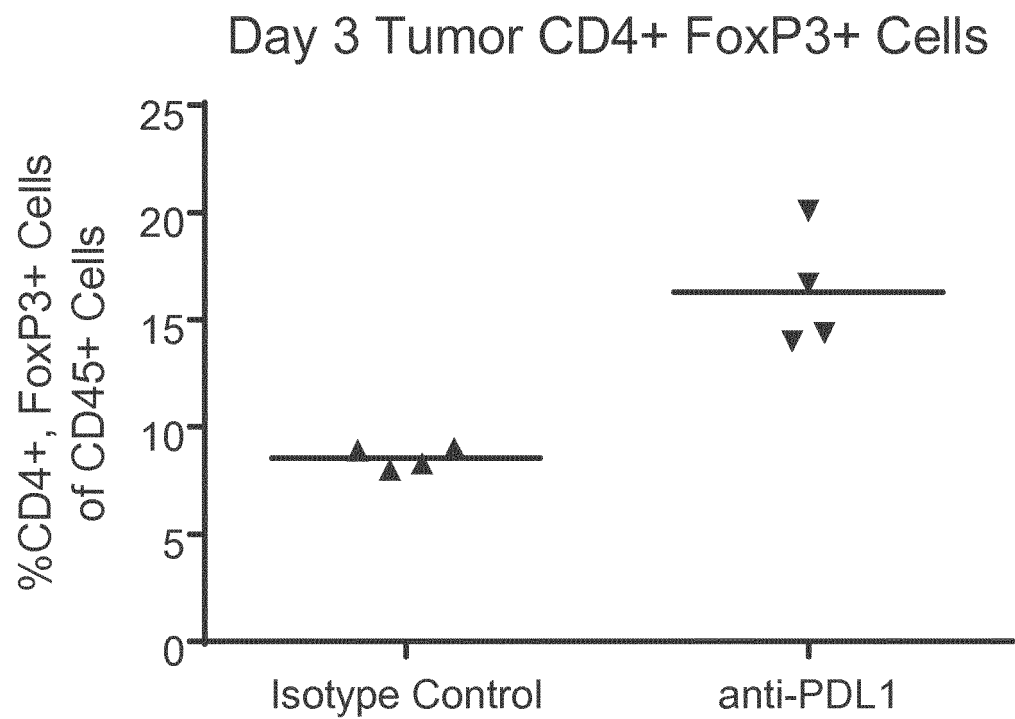
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FIG. 14



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FIG. 15



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FIG. 16A

CD73 Expression on CD4+ FoxP3+Tregs in CT26 Tumor

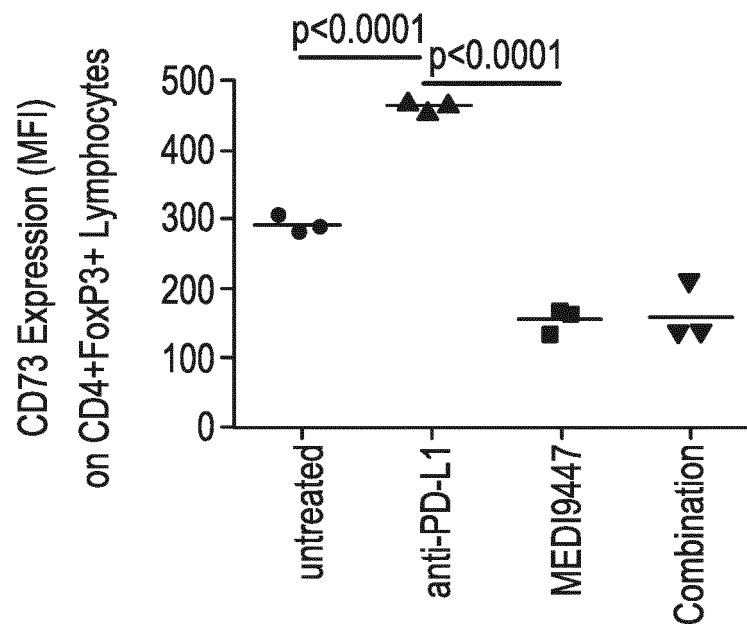
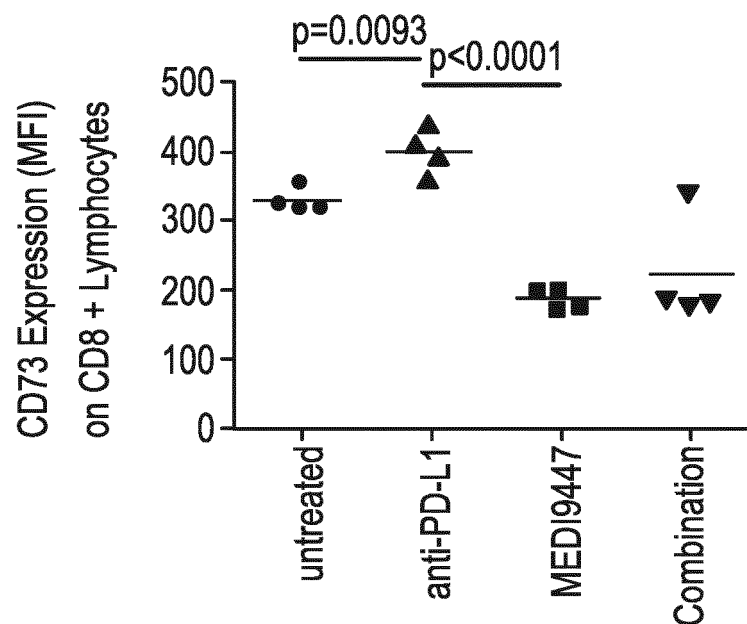


FIG. 16B

CD73 Expression on CD8+ T cells in CT26 Tumor



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FIG. 17A

CD73 Enzymatic Activity on CT26 Tumor Cells.

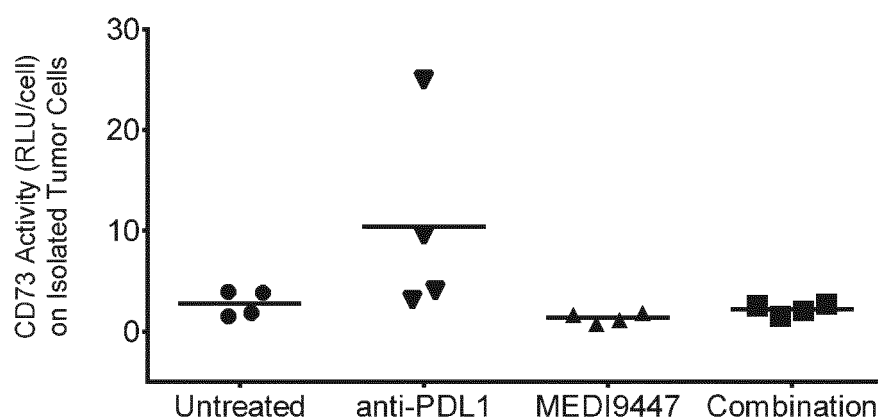
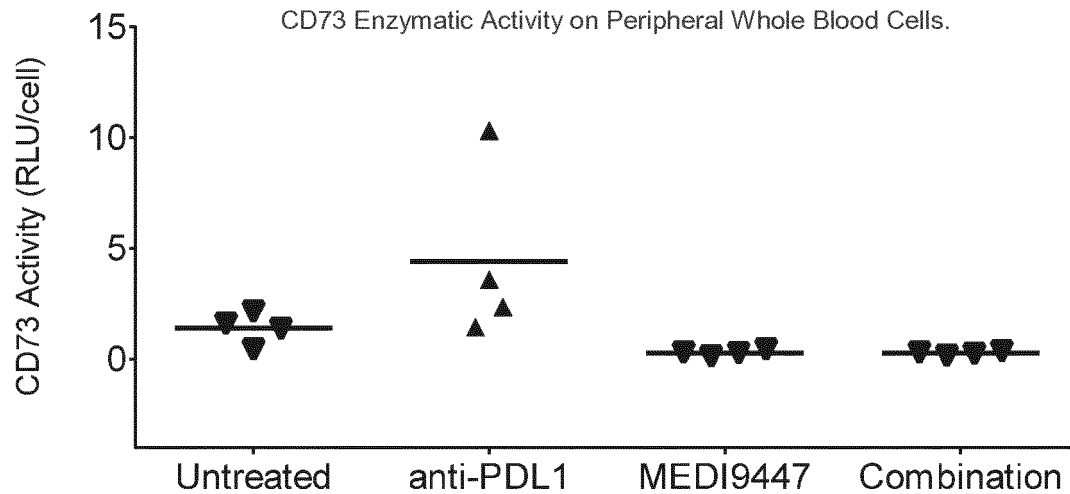


FIG. 17B

CD73 Enzymatic Activity on Peripheral Whole Blood Cells.



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FIG. 18

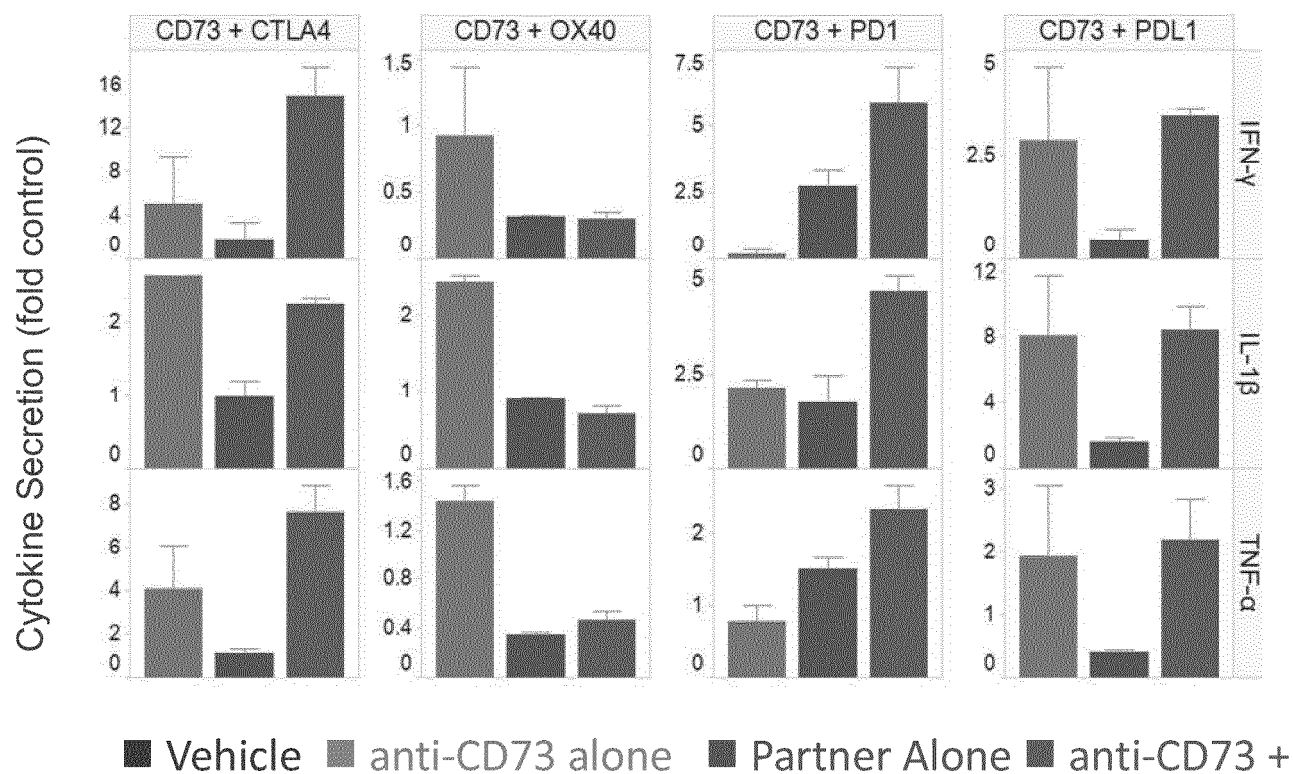
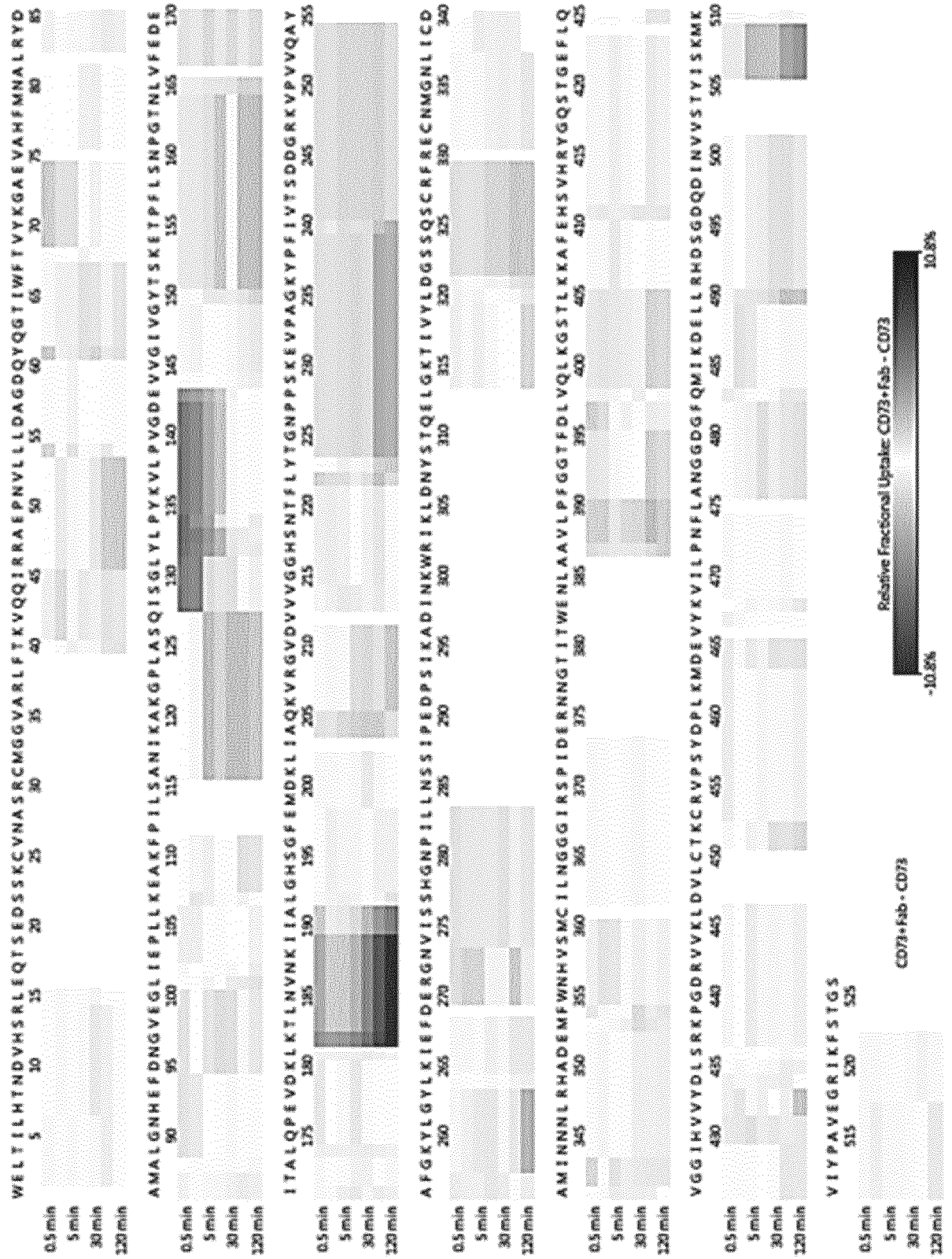


FIG. 19A



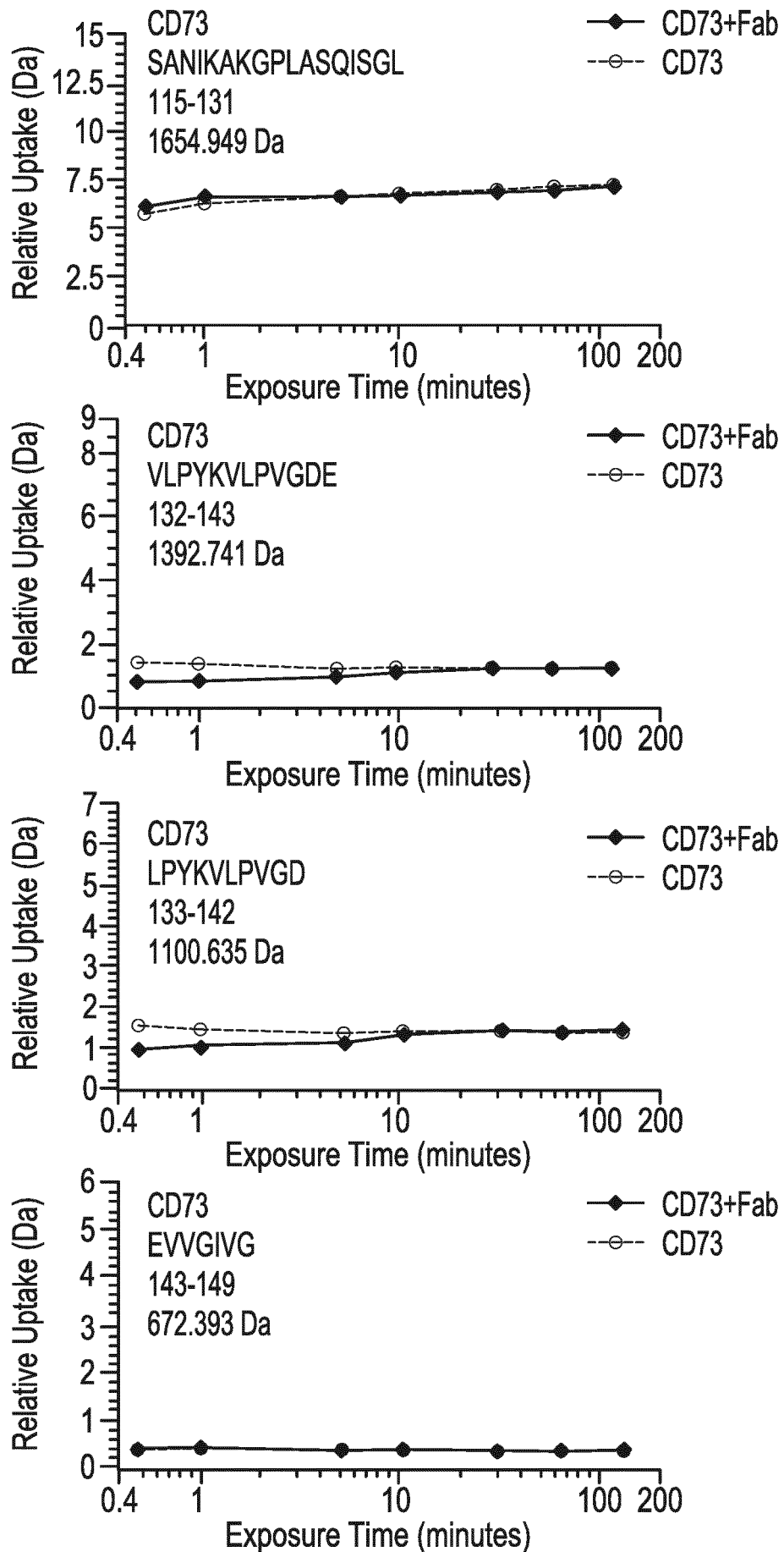
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FIG. 19B



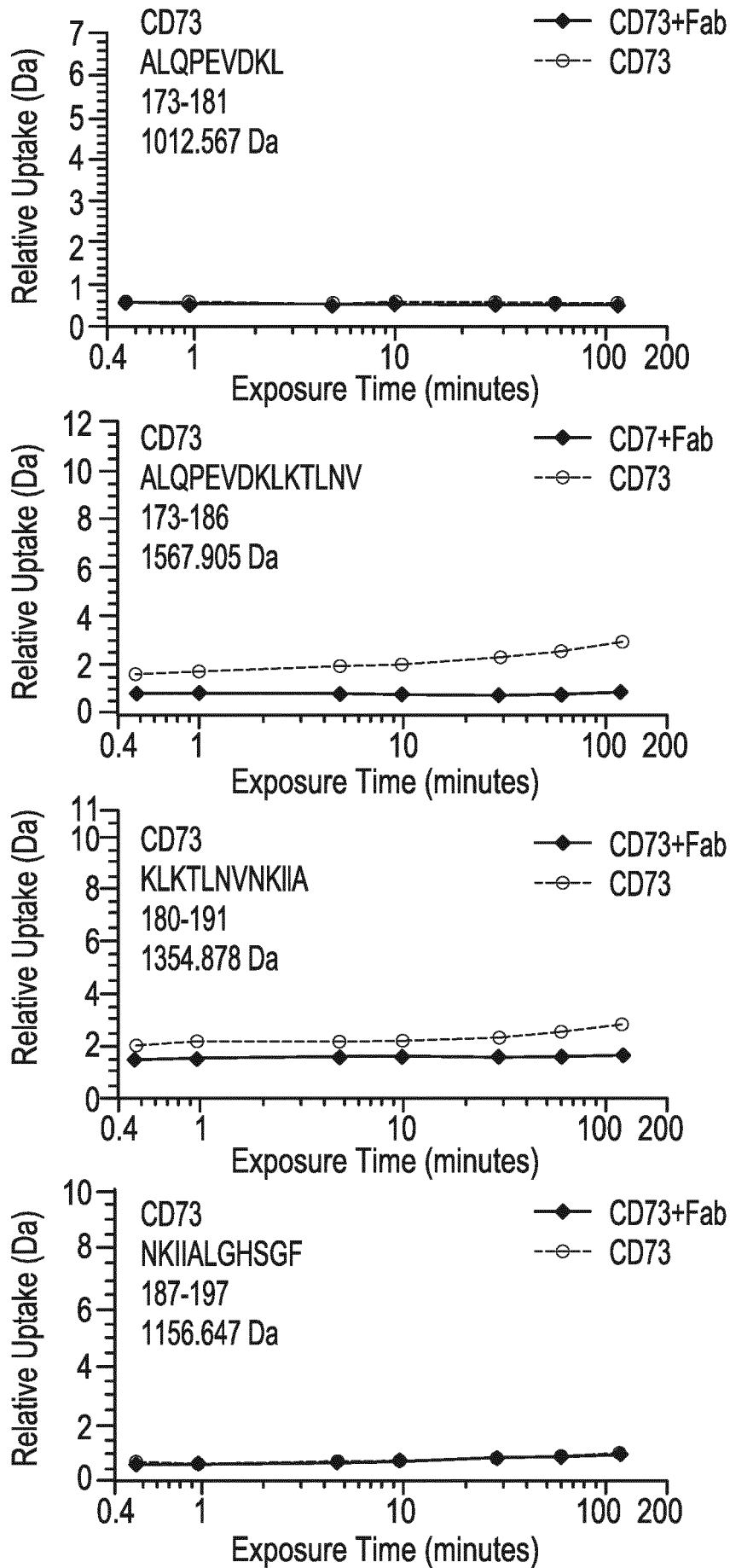
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FIG. 20A



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FIG. 20B



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FIG. 20C

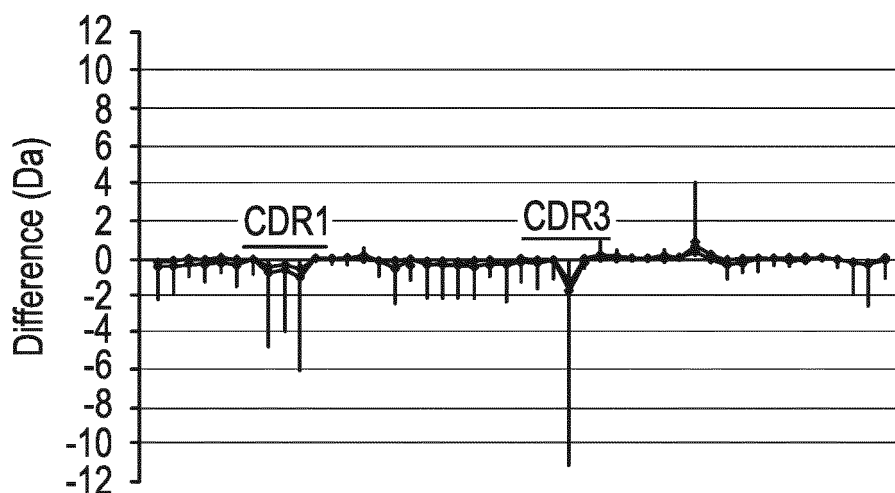


FIG. 20D

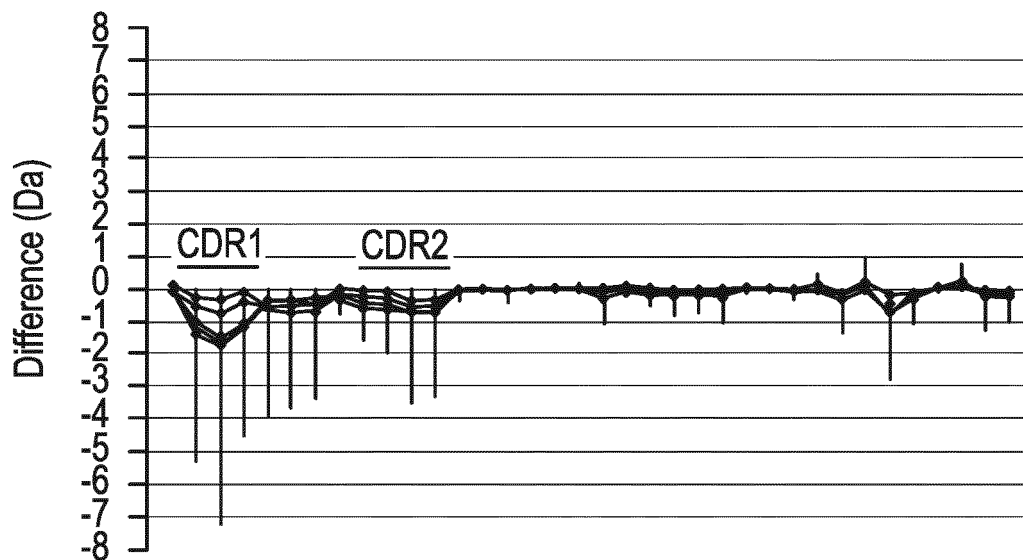
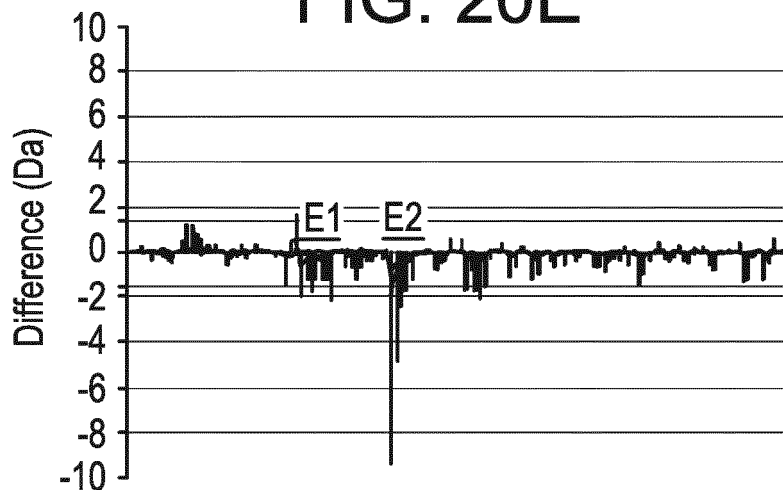


FIG. 20E



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FIG. 21A

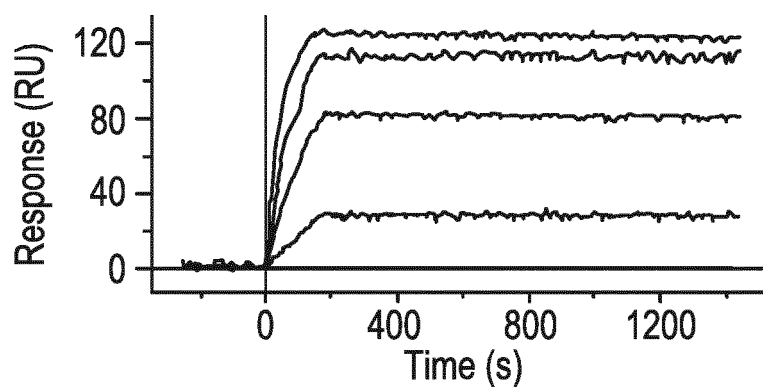


FIG. 21B

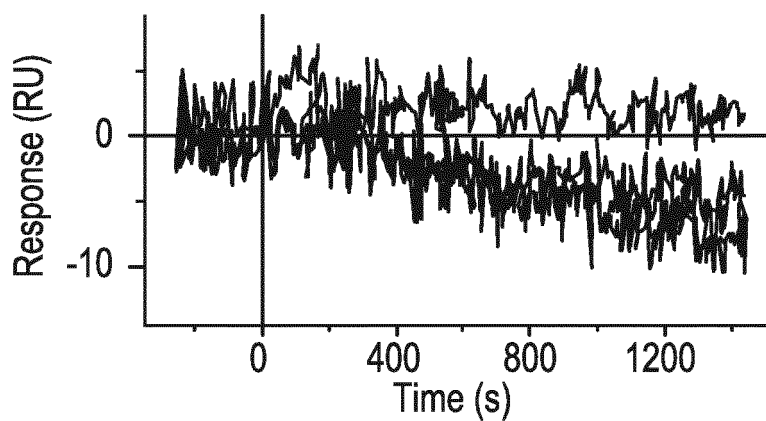


FIG. 21C

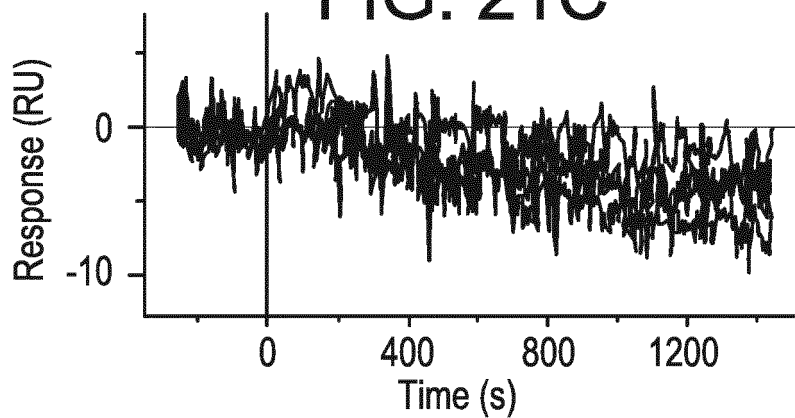
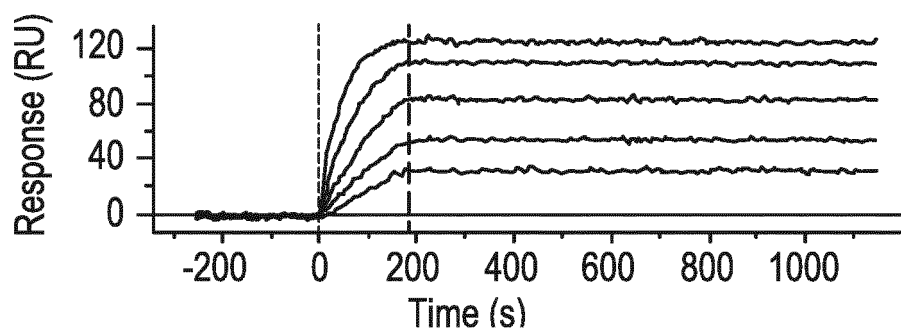
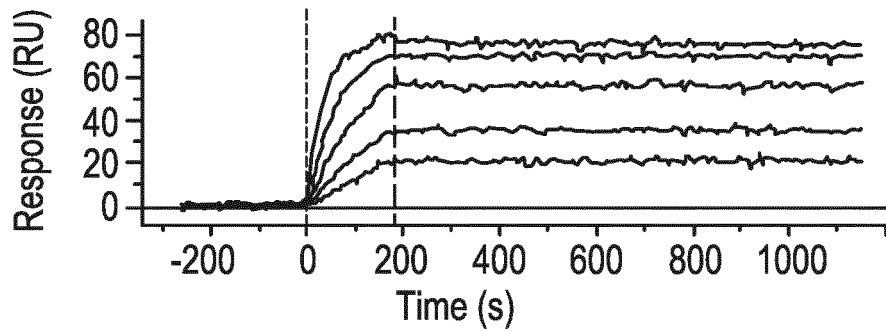
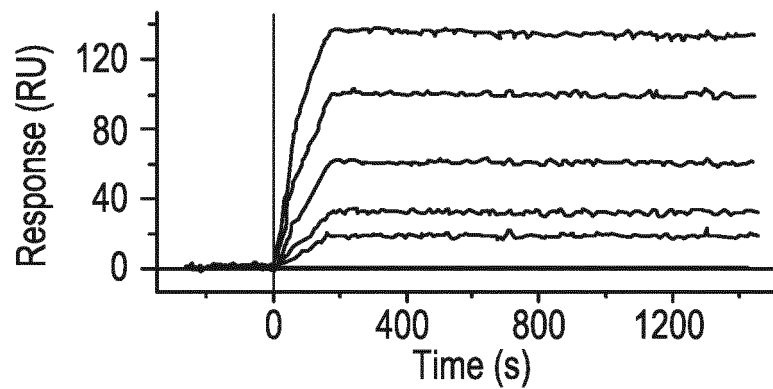
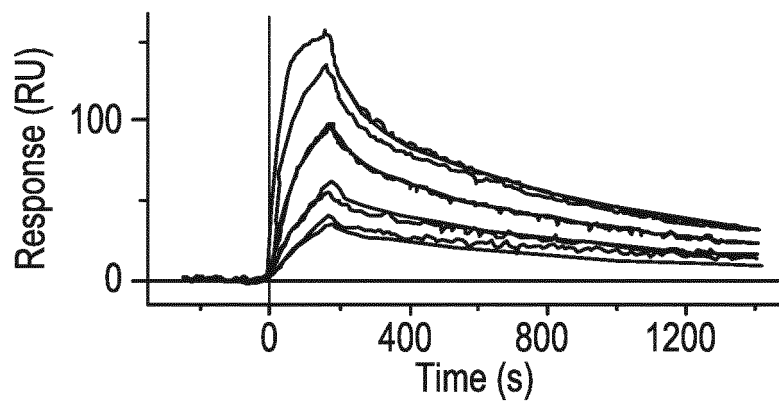
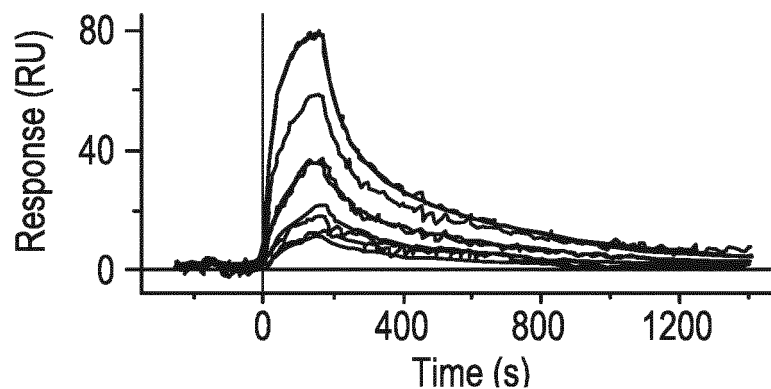


FIG. 21D



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FIG. 21E**FIG. 21F****FIG. 21G****FIG. 21H**

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FIG. 22

Key		HDX-MX identified interface		AMP binding/catalytic site
		Metal binding/catalytic site residues		Transition state stabilizer
		N-glycosylation site		

N-Term. Region 1a

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Human	W	E	L	T	I	L	H	T	N		V		S	R	L	E
Chicken	L	R	L	R	L	L	H	T	N		V		A	H	V	E

N-Term. Region 1a

Position	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Human	Q	T	S	E	D	S	S	K	C	V		A	S	R	- C
Chicken	A	R	G	-	-	-	-	-	C	A	E	G	P	R	G C

N-Term. Region 1a

Position	32	33	34
Human	M	G	G
Chicken	F	G	G

N-Term. Region 1b

Position	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Human	V	A	R	L	F	T	K	V	Q	Q	I	R	R	A	E	P
Chicken	V	A	R	R	A	A	R	V	A	A	E	R	A	A	Q	R

N-Term. Region 1b

Position	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Human	N	V	L	L	L	D	A	G		Q	Y	Q	G	T	I	W
Chicken	N	V	L	L	L	D	A	G		Q	Y	Q	G	S	V	W

N-Term. Region 1b

Position	67	68	69	70	71
Human	F	T	V	Y	K
Chicken	F	S	R	F	K

N-Term. Region 2a

Position	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
Human	G	A	E	V	A	H	F	M	N	A	L	R	Y	D	A	M
Chicken	G	Q	E	A	V	H	F	M	N	L	L	R	Y	D	A	M

N-Term. Region 2a

Position	88	89	90	91
Human	A	L	G	
Chicken	A	L	G	

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FIG. 22 continued**N-Term. Region 2b**

Position	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
Human	H	E	F	D	N	G	V	E	G	L	I	E	P	L	L	K
Chicken	H	E	F	D	E	G	V	R	G	L	L	N	P	L	L	R

N-Term. Region 2b

Position	108	109	110	111	112	113
Human	E	A	K	F	P	I
Chicken	N	A	S	F	A	I

N-Term. Region 2c

Position	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129
Human	L	S	A	N	I	K	A	K	G	P	L	A	S	Q	I	S
Chicken	L	S	A	N	I	K	G	K	T	P	L	G	N	Q	M	M

N-Term. Region 2c

Position	130	131	132	133	134
Human	G	L	Y	L	P
Chicken	K	Y	V	H	P

N-Term. Region 2d

Position	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Human	Y	K	V	L	P	V	G	D	E	V	V	G	I	V	G	Y
Chicken	Y	K	I	L	H	I	D	S	E	K	I	G	I	V	G	Y

N-Term. Region 2d

Position	151	152
Human	T	S
Chicken	T	T

N-Term. Region 3a

Position	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
Human	K	E	T	P	F	L	S	N	P	G	T	N	L	V	F	E
Chicken	Q	E	T	S	F	L	S	Q	P	G	N	D	V	I	F	E

N-Term. Region 3a

Position	169	170
Human	D	E
Chicken	D	E

N-Term. Region 3b

Position	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186
Human	I	T	A	L	Q	P	E	V	D	K	L	K	T	L	N	V
Chicken	I	E	A	L	Q	V	Q	V	N	K	L	T	A	M	G	V

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FIG. 22 continued

N-Term. Region 3b

Position	187	188
Human	N	K
Chicken	N	K

N-Term. Region 3c

Position	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204
Human	I	I	A	L	G	H	S	G	F	E	M	D	K	L	I	A
Chicken	I	I	A	L	G	H	S	G	F	T	V	D	I	N	I	A

N-Term. Region 3c

Position	205	206
Human	Q	K
Chicken	Q	K

N-Term. Region 3d

Position	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
Human	V	R	G	V	D	V	V	V	G	G	H	S	N	T	F	L
Chicken	V	K	G	V	D	V	V	I	G	G	H	T	N	T	F	L

N-Term. Region 3d

Position	223	224
Human	Y	T
Chicken	Y	T

N-Term. Region 4

Position	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Human	G	N	P	P	S	K	E	V	P	A	G	K	Y	P	F	I
Chicken	G	T	P	P	S	T	E	Q	P	A	G	P	Y	P	F	M

N-Term. Region 4

Position	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256
Human	V	T	S	D	D	G	R	K	V	P	V	V	Q	A	Y	A
Chicken	V	D	S	D	D	G	R	K	V	P	V	V	Q	A	Y	A

N-Term. Region 4

Position	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272
Human	F	G	K	Y	L	G	Y	L	K	I	E	F	D	E	R	G
Chicken	Y	G	K	Y	L	G	Y	L	N	V	T	F	D	E	K	G

N-Term. Region 4

Position	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
Human	N	V	I	S	S	H	G	N	P	I	L	L	N	S	S	I
Chicken	N	V	V	E	A	V	G	N	P	I	L	L	D	S	S	V

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FIG. 22 continued

N-Term. Region 4

Position	289	290	291
Human	P	E	D
Chicken	P	E	D

Alpha Helix Linker

Position	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307
Human	P	S	I	K	A	D	I	N	K	W	R	I	K	L	D	N
Chicken	E	Q	I	K	E	E	V	E	K	W	R	K	N	L	G	N

Alpha Helix Linker

Position	308	309	310
Human	Y	S	T
Chicken	Y	S	-

C-Term. Domain 1

Position	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326
Human	Q	E	L	G	K	T	I	V	Y	L	D	G	S	S	Q	S
Chicken	K	E	I	G	T	T	S	V	Y	L	N	G	T	S	E	A

C-Term. Domain 1

Position	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
Human	C	R	F	R	E	C	N	M	G	N	L	I	C	D	A	M
Chicken	C	R	F	Q	E	C	N	M	G	N	L	L	C	D	A	M

C-Term. Domain 1

Position	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358
Human	I	N	N	N	L	R	H	A	D	E	M	F	W	N	H	V
Chicken	L	Y	E	N	V	R	R	P	D	R	K	S	W	N	H	V

C-Term. Domain 1

Position	359	360	361	362	363	364
Human	S	M	C	I	L	N
Chicken	S	L	C	I	L	N

C-Term. Domain 2

Position	365	366	367	368	369	370	371	372	373	374	375	376		377	378	379
Human	G	G	G	I	R	S	P	I	D	E	R	N	-	N	G	T
Chicken	G	G	G	I	R	A	S	I	D	E	R	N	A	N	G	S

C-Term. Domain 2

Position	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395
Human	I	T	W	E	N	L	A	A	V	L	P	F	G	G	T	F
Chicken	I	T	M	E	D	L	L	S	V	L	P	F	G	G	R	F

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FIG. 22 continued

C-Term. Domain 2

Position	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411
Human	D	L	V	Q	L	K	G	S	T	L	K	K	A	F	E	H
Chicken	D	L	V	T	L	K	G	S	T	L	K	E	A	F	E	H

C-Term. Domain 2

Position	412	413	414	415	416	417
Human	S	V	H	R	Y	G
Chicken	S	V	R	R	Y	G

C-Term. Domain 3

Position	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433
Human	Q	S	T	G	E	F	L	Q	V	G	G	I	H	V	V	Y
Chicken	R	G	T	G	E	L	L	Q	V	G	G	I	H	V	V	Y

C-Term. Domain 3

Position	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449
Human	D	L	S	R	K	P	G	D	R	V	V	K	L	D	V	L
Chicken	D	L	S	R	A	P	G	H	R	A	V	S	I	E	V	L

C-Term. Domain 3

Position	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465
Human	C	T	K	C	R	V	P	S	Y	D	P	L	K	M	D	E
Chicken	C	T	A	C	R	V	P	A	Y	V	P	L	E	M	D	E

C-Term. Domain 3

Position	466	467	468	469	470	471
Human	V	Y	K	V	I	L
Chicken	V	Y	N	V	T	L

C-Term. Domain 4

Position	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487
Human	P	N	F	L	A	N	G	G	D	G	F	Q	M	I	K	D
Chicken	P	S	Y	M	L	F	G	G	D	G	Y	Y	M	L	R	D

C-Term. Domain 4

Position	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503
Human	E	L	L	R	H	D	S	G	D	Q	D	I	N	V	V	S
Chicken	N	H	I	T	Y	S	K	G	E	P	D	I	E	V	V	S

C-Term. Domain 4

Position	504	505	506	507	508
Human	T	Y	I	S	K
Chicken	R	Y	L	D	R

C-Term. Domain 4

Position	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523
Human	M	K	V	I	Y	P	A	V	E	G	R	I	K	F	S
Chicken	M	K	R	V	Y	P	A	V	E	G	R	I	K	F	S

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FIG. 23

CD73 Construct	KO Swap/Mutation Position	KD (M)	ka (1/Ms)	kd (1/s)
Wild Type human CD73	WT huCD73	4.20E-12	4.63E+06	1.94E-05
KO_Nterm+Cterm	KO_1-291+311-523		No Binding	
KO_Nterm	KO_1-291		No Binding	
KO_Linkers	KO_292-310	4.14E-12	5.57E+06	2.31E-05
KO_Cterm	KO_311-523	1.70E-12	4.75E+06	8.10E-06
HDX_E1	KO_132-143	9.90E-12	2.15E+06	2.12E-05
HDX_E2	KO_182-187*	2.83E-09	5.73E+06	1.62E-02
HDX_E1+E2	KO_132-143+182-187*	4.43E-09	4.76E+06	2.11E-02
V144K	V144K	8.14E-11	1.13E+06	9.18E-05
K180A	K180A	4.35E-11	3.45E+06	1.54E-04
N185G	N185G*	2.69E-11	9.11E+06	2.45E-04
V144K+K180A	V144K+K180A	2.68E-09	1.58E+06	4.25E-03
V144K+N185G	V144K+N185G		No Binding	
K180A+N185G	K180A+N185G		No Binding	

*Kinetics values derived from 2:1 fit (see Methods)

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FIG. 24C

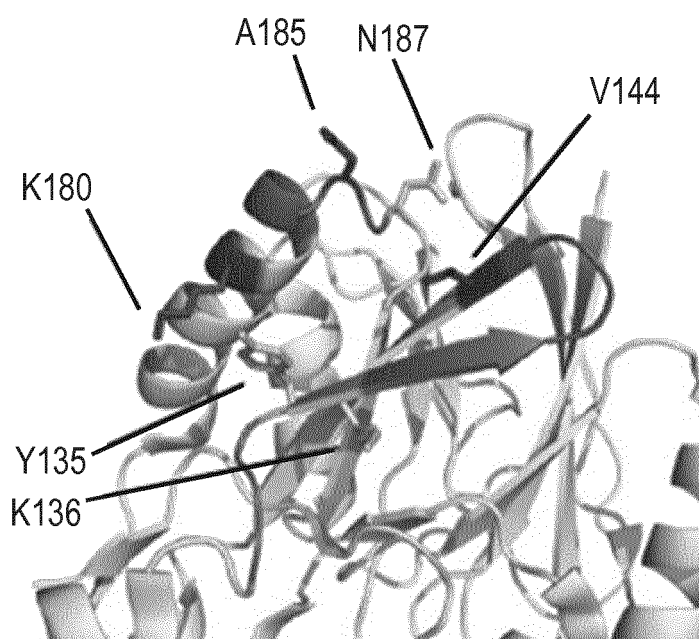
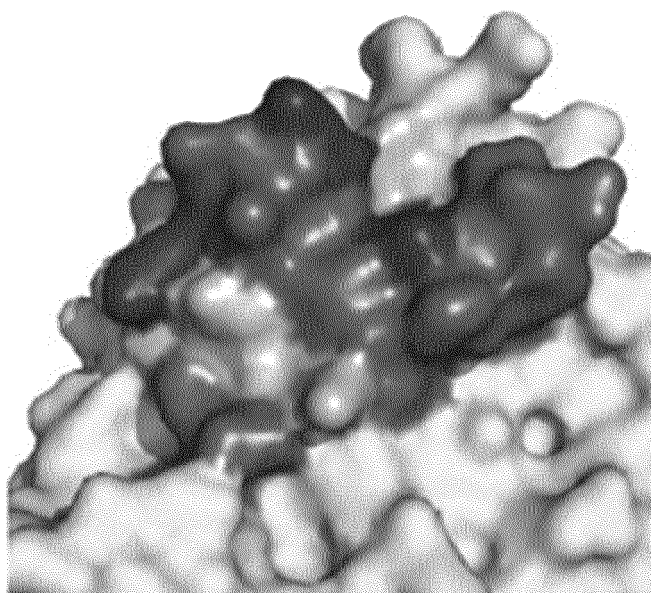


FIG. 24D



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FIG. 24F

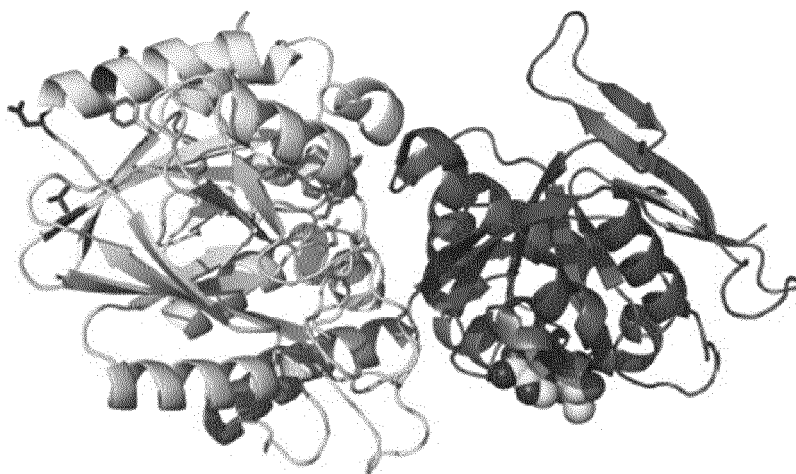
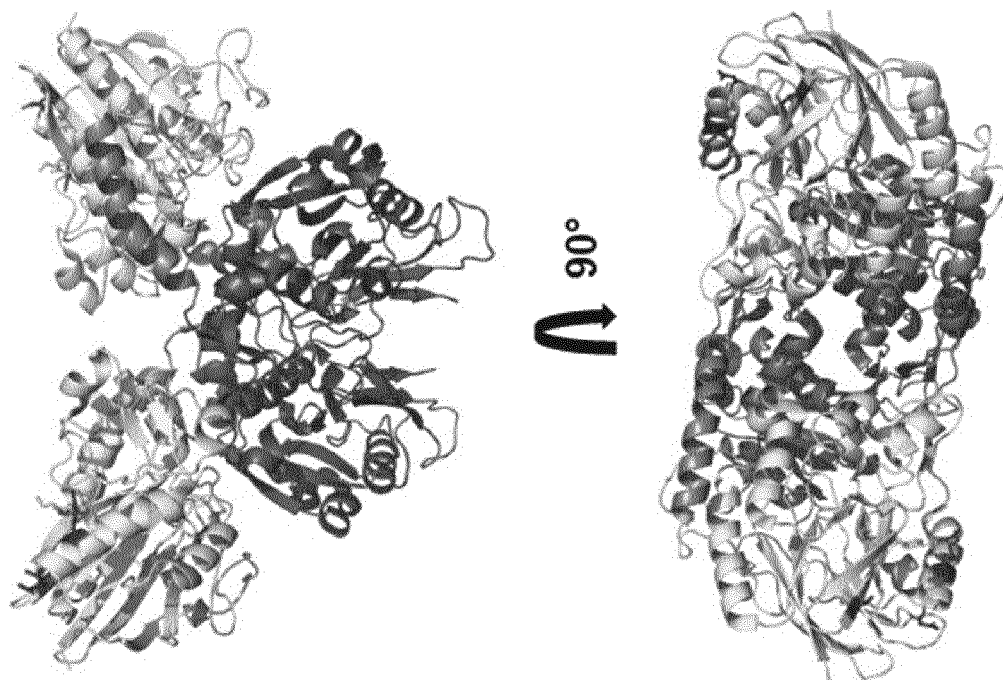


FIG. 24E



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FIG. 25A

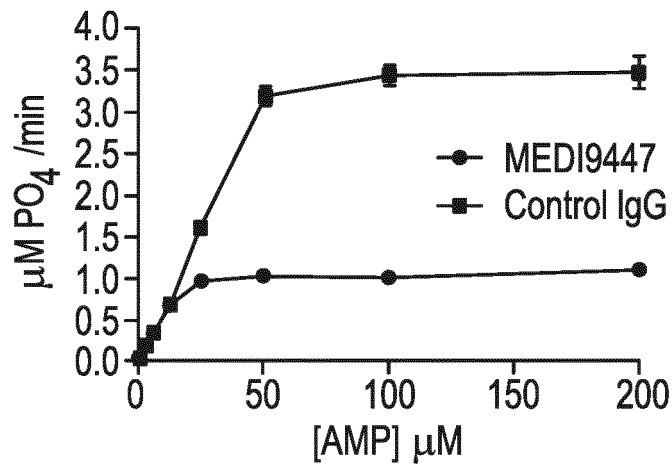


FIG. 25B

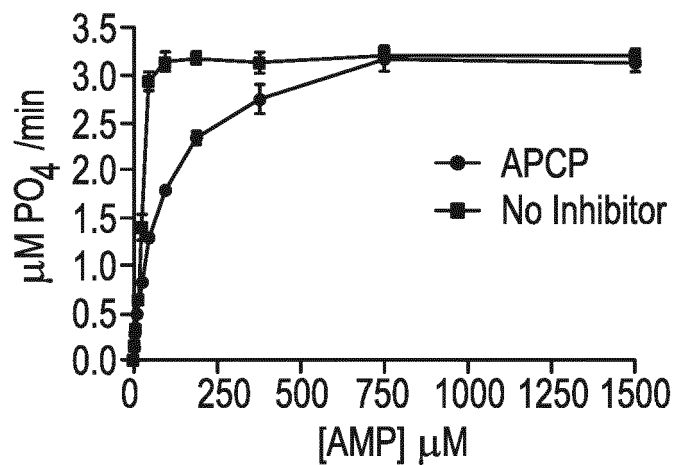
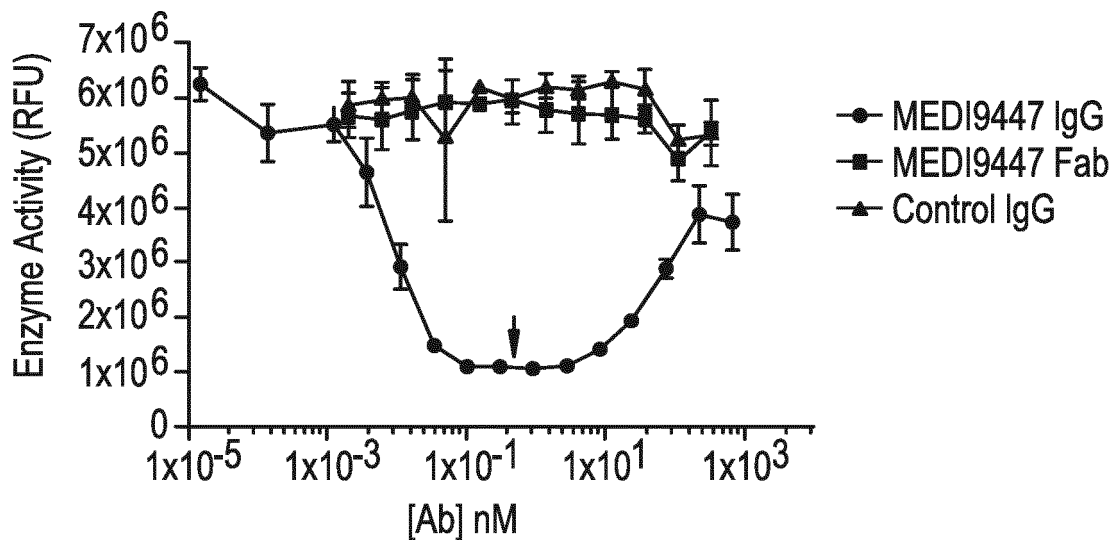


FIG. 25C



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FIG. 26A

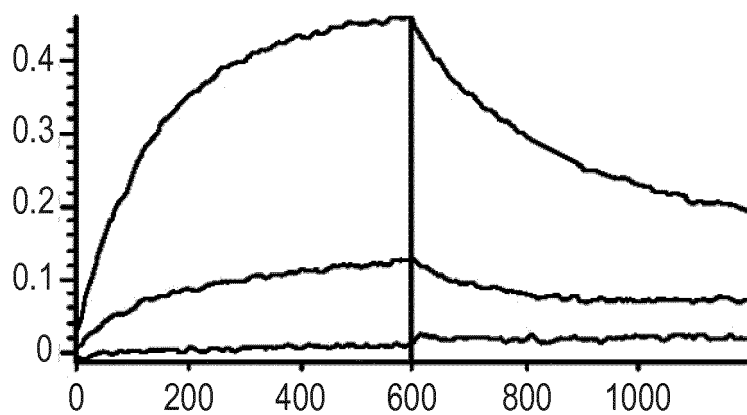
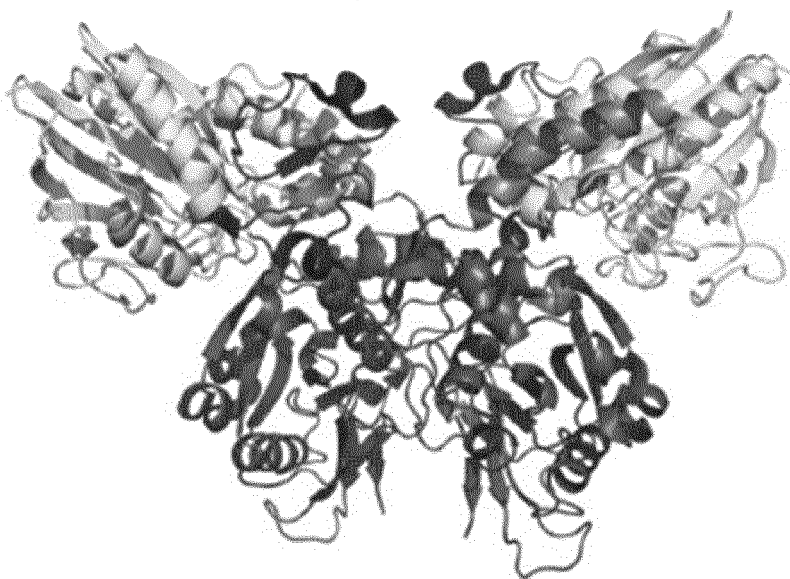
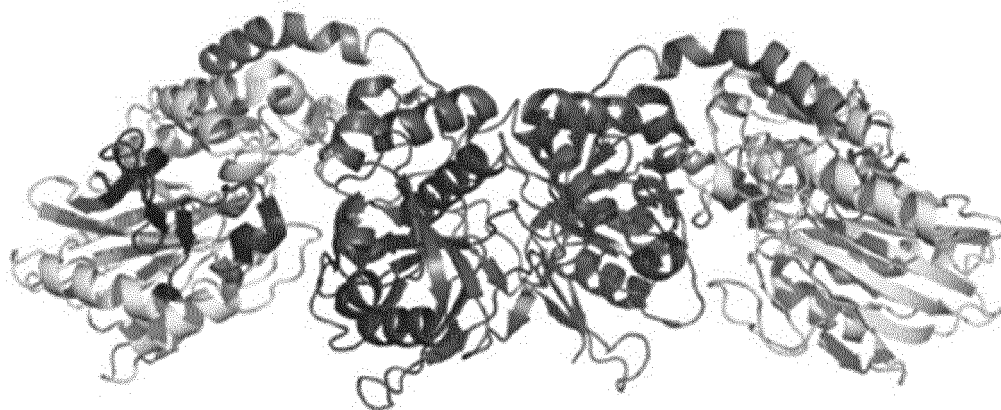


FIG. 26B

Open State

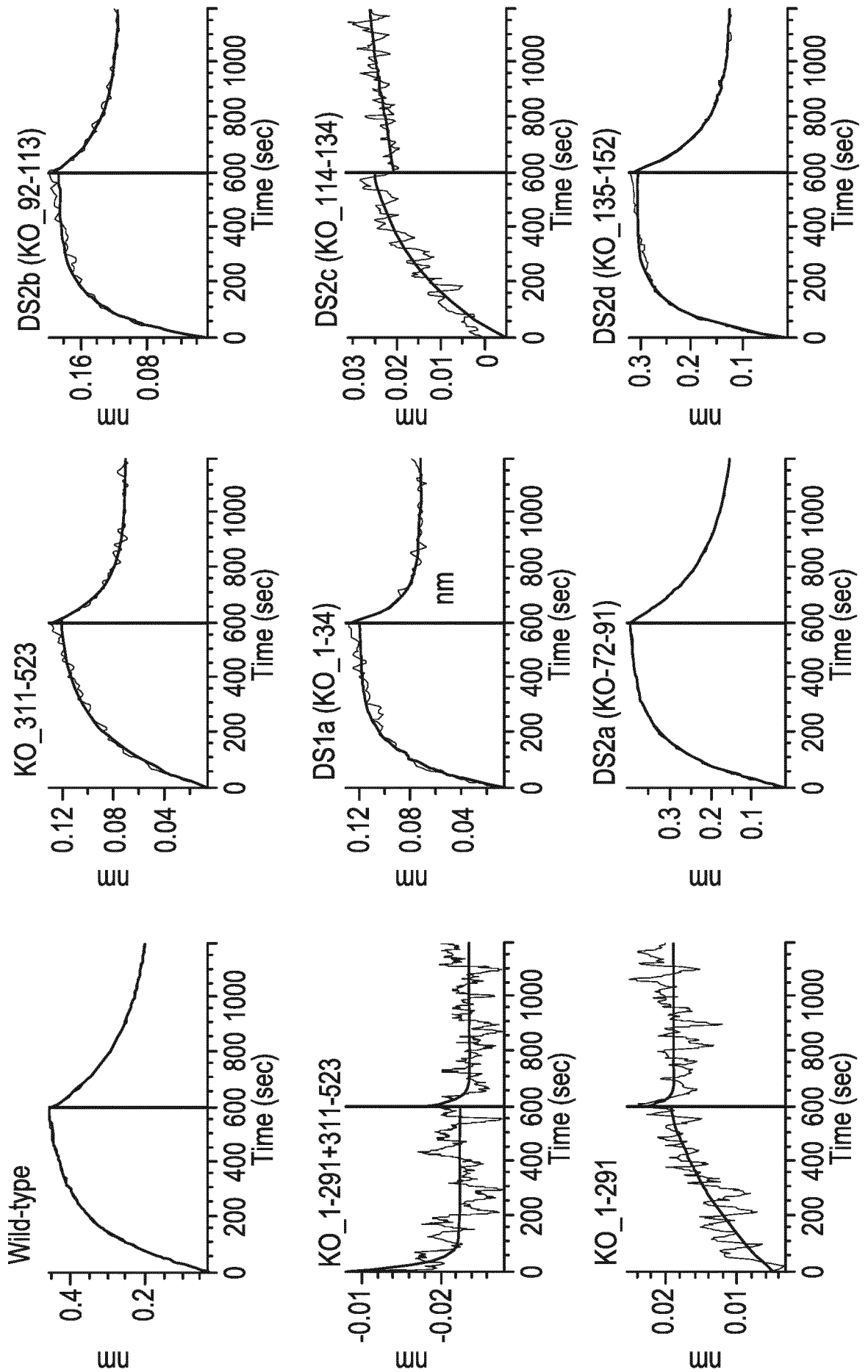


Closed State



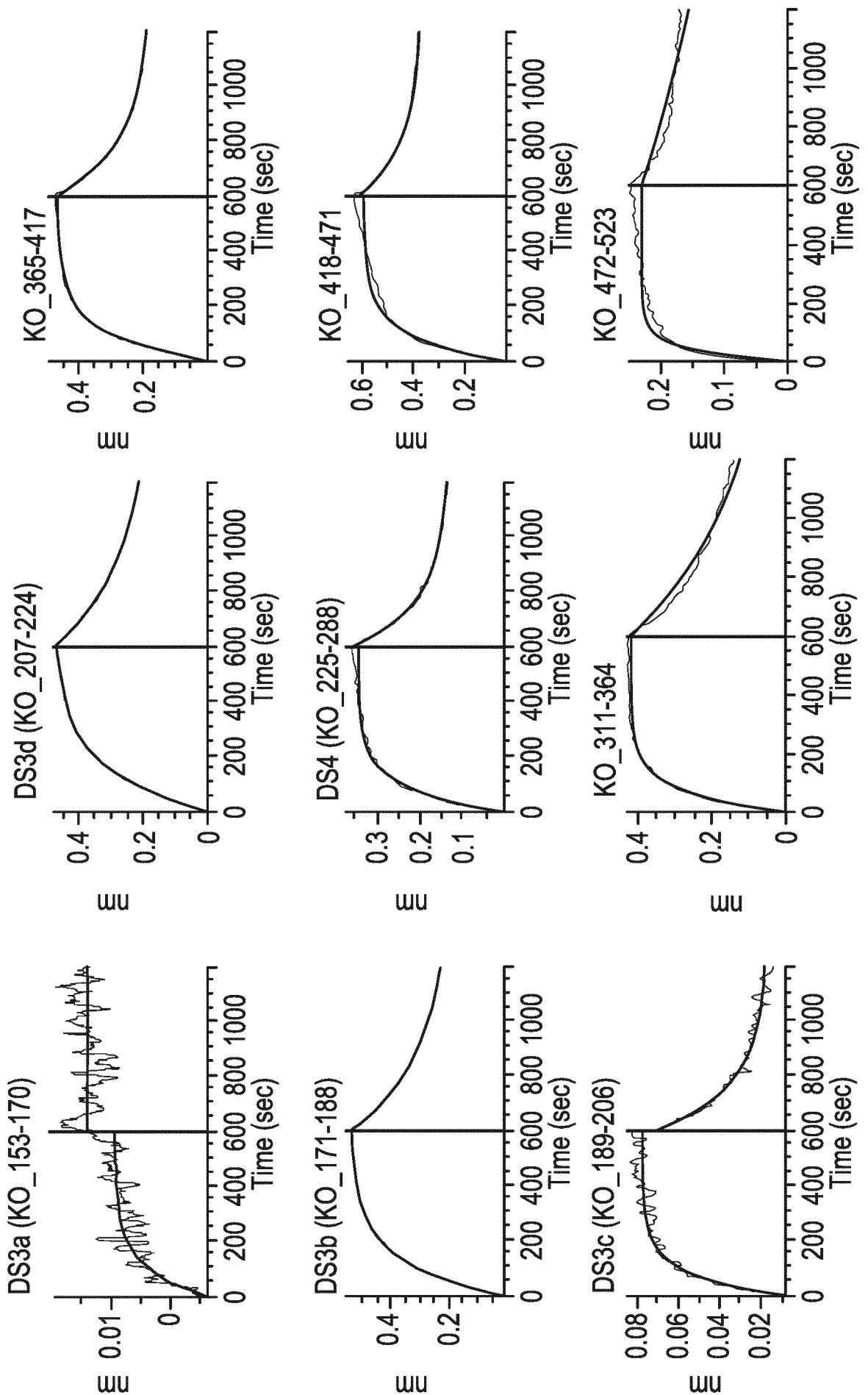
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FIG. 26C



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FIG. 26C continued



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FIG. 27A

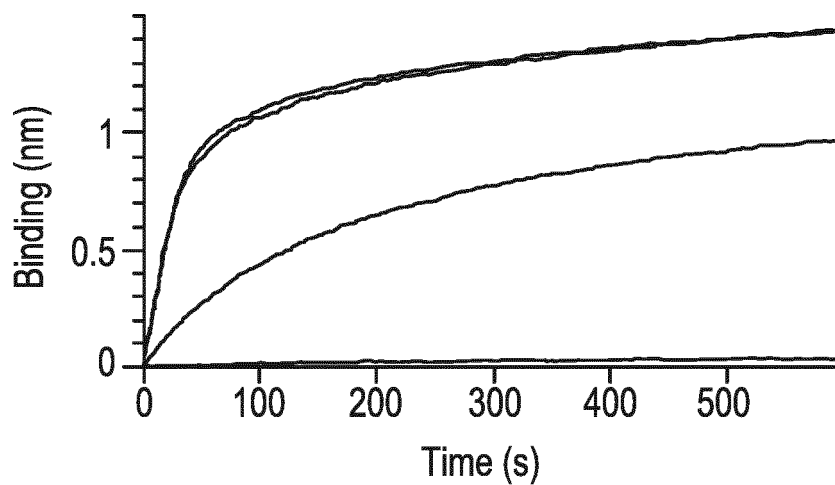
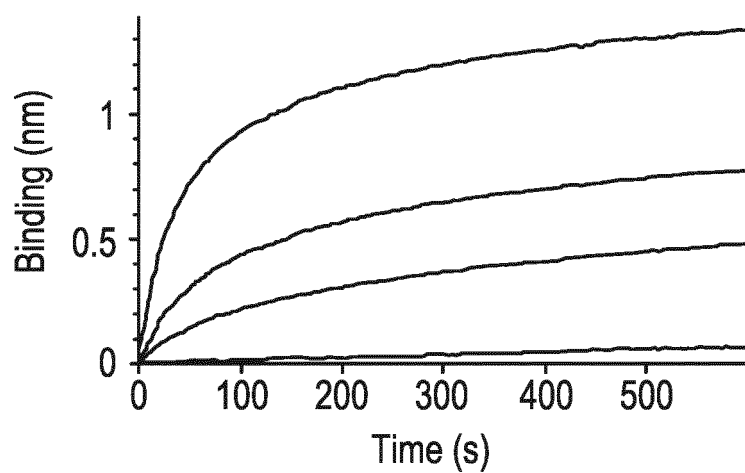
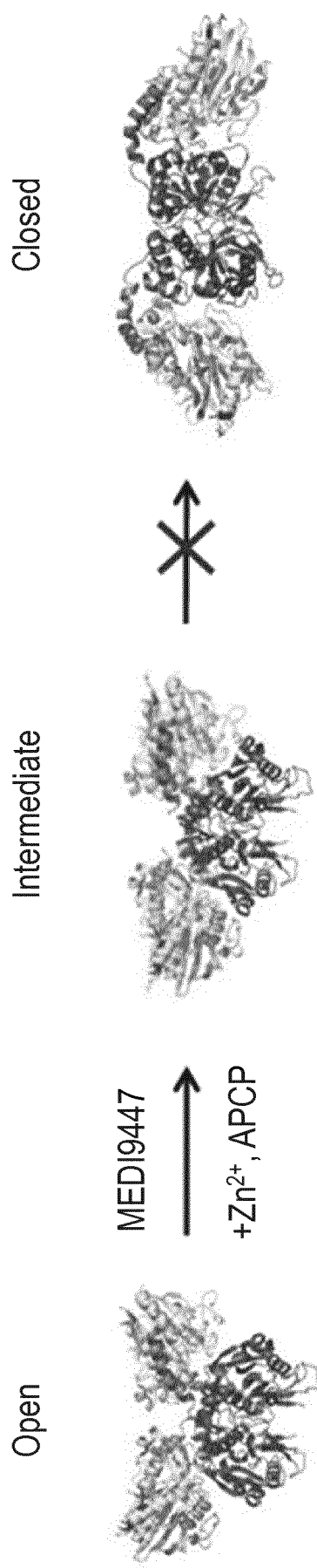


FIG. 27B



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FIG. 27C



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FIG. 28A

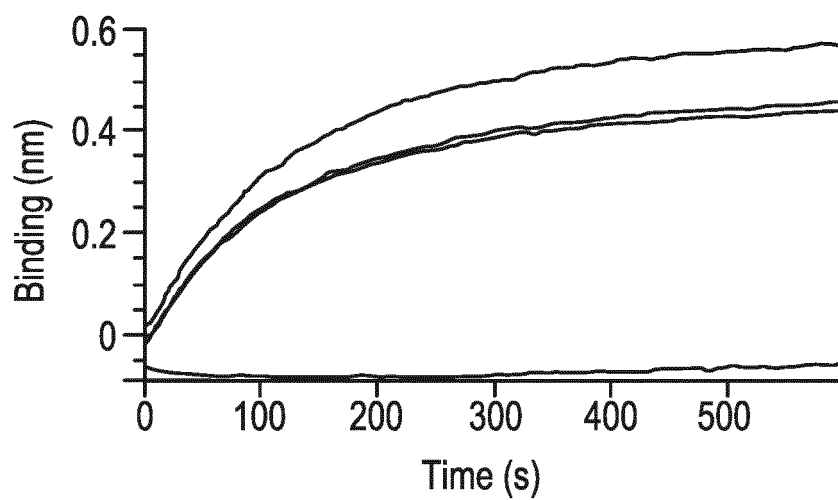


FIG. 28B

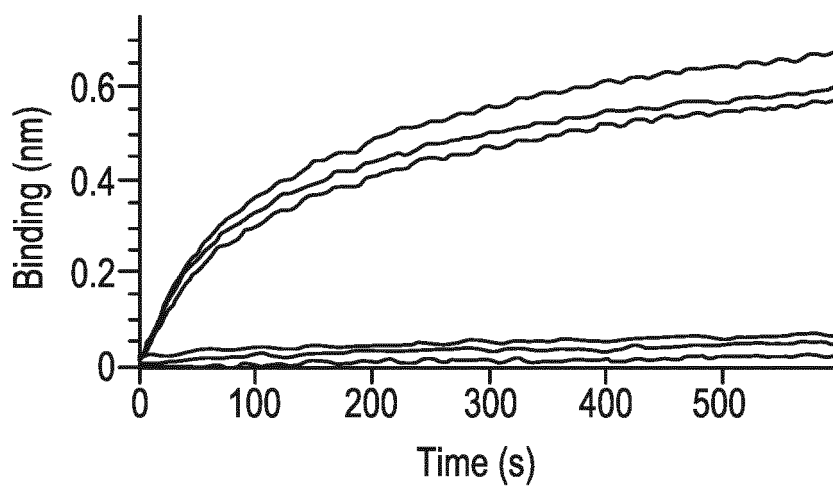


FIG. 29A

MEDI9447: CD73 Molar Ratio		
	1:0	0:1
	Peak 1	Peak 1
SEC Retention time (min)	8.6	8.6
Mw (g/mol)	1.454E+05(±0.092%)	1.248E5 (±0.090%)
Polydispersity (Mw/Mn)	1.001 (±0.130%)	1.002 (±0.126%)

1:1		
	Peak 1	Peak 2
	5.7	6.2
SEC Retention time (min)		
Mw (g/mol)	1.736E+06 (±0.105%)	6.643E+05(±0.244%)
Polydispersity (Mw/Mn)	1.029 (±0.147%)	1.004 (±0.342%)
		1.001 (±1.255%)

0.5:1		
	Peak 1	Peak 2
	5.7	6.4
SEC Retention time (min)		
Mw (g/mol)	1.336E+06 (±0.120%)	5.452E+05 (±0.094%)
Polydispersity (Mw/Mn)	1.029 (±0.169%)	1.004 (±0.132%)
		1.001 (±0.161%)

0.1:1		
	Peak 1	Peak 2
	5.7	6.4
SEC Retention time (min)		
Mw (g/mol)	1.230E+06 (±0.093%)	5.298E+05 (±0.066%)
Polydispersity (Mw/Mn)	1.015 (±0.129%)	1.002 (±0.094%)
		1.002 (±0.118%)

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FIG. 29A continued

mAb B:CD73 Molar Ratio	
	1:0
	Peak 1
SEC Retention time (min)	8.2
Mw (g/mol)	1.485E+05(±0.099%)
Polydispersity (Mw/Mn)	1.002 (±0.140%)
	8.6
	1.248E5 (±0.090%)
	1.002 (±0.126%)

1:1	
	Peak 1
	Peak 2
SEC Retention time (min)	6.6
	7.1
Mw (g/mol)	3.802E+05 (±0.075%)
Polydispersity (Mw/Mn)	2.965E+05 (±0.108%)
	1.000 (±0.106%)
	1.000 (±0.153%)

0.5:1	
	Peak 1
	Peak 2
SEC Retention time (min)	7.2
	8.5
Mw (g/mol)	2.935E+05 (±0.112%)
Polydispersity (Mw/Mn)	1.290E+05 (±0.086%)
	1.000 (±0.159%)
	1.000 (±0.122%)

0.1:1	
	Peak 1
	Peak 2
SEC Retention time (min)	7.3
	8.6
Mw (g/mol)	2.716E+05 (±0.071%)
Polydispersity (Mw/Mn)	1.258E+05 (±0.098%)
	1.000 (±0.100%)
	1.002 (±0.139%)

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FIG. 29B

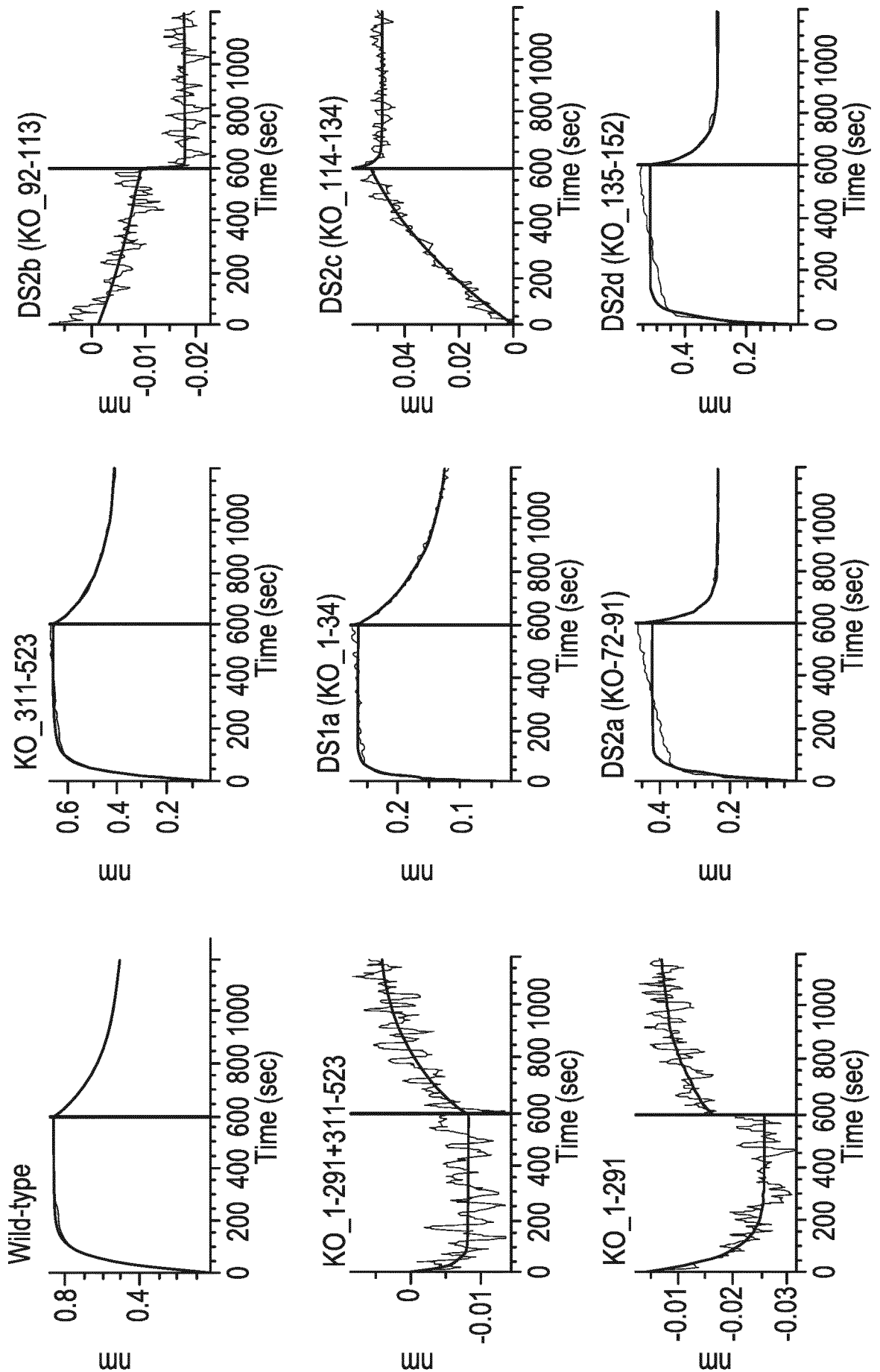
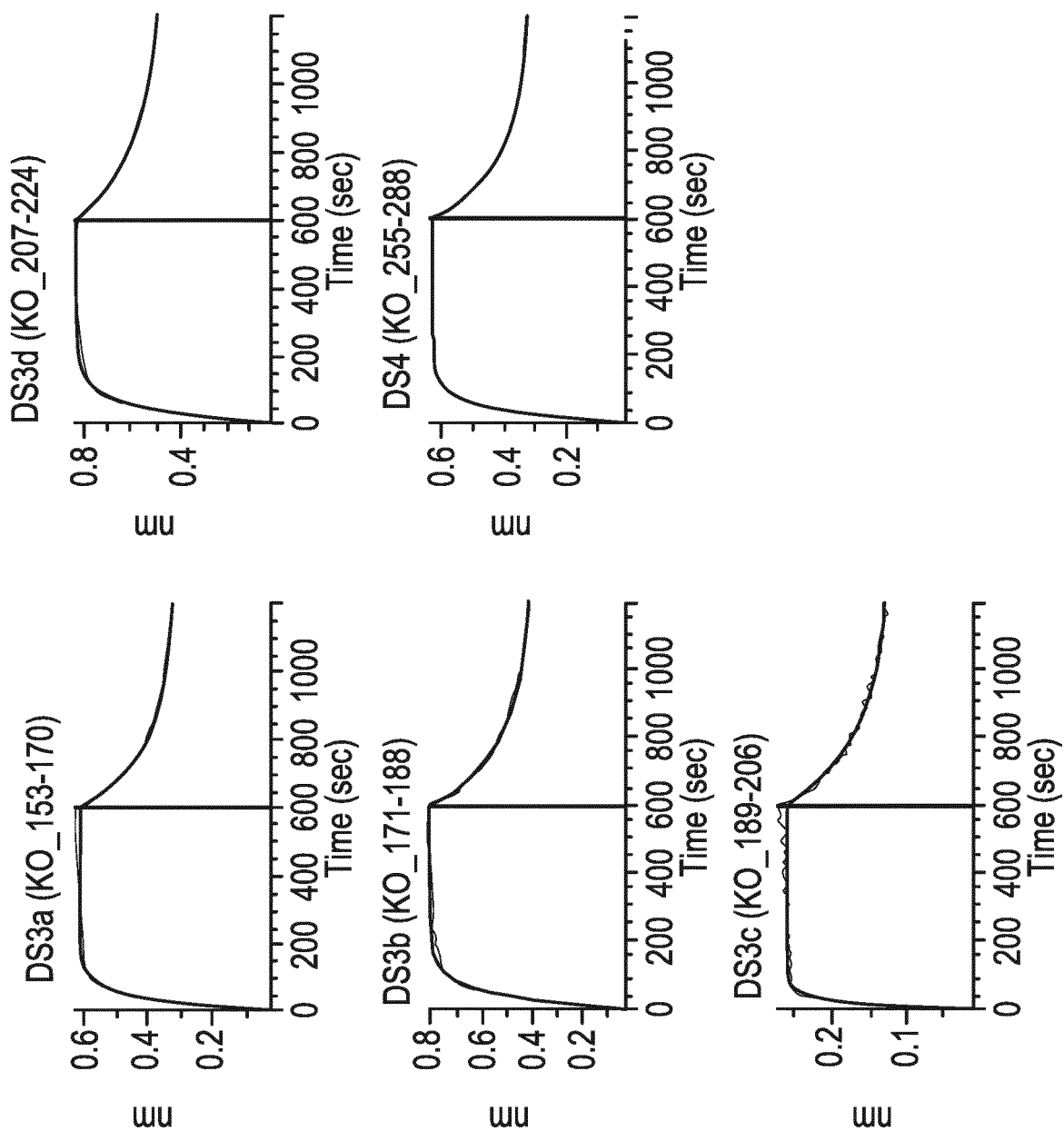


FIG. 29B continued



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FIG. 30A

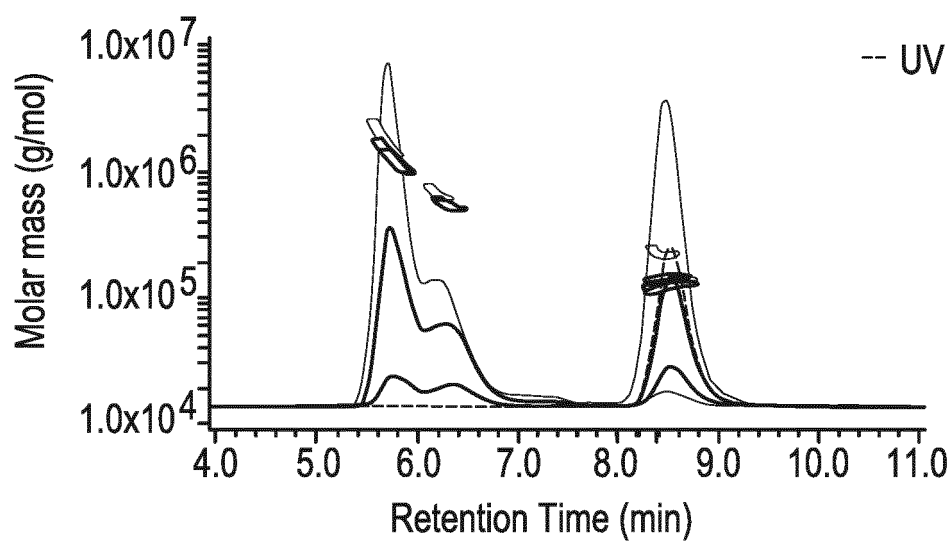
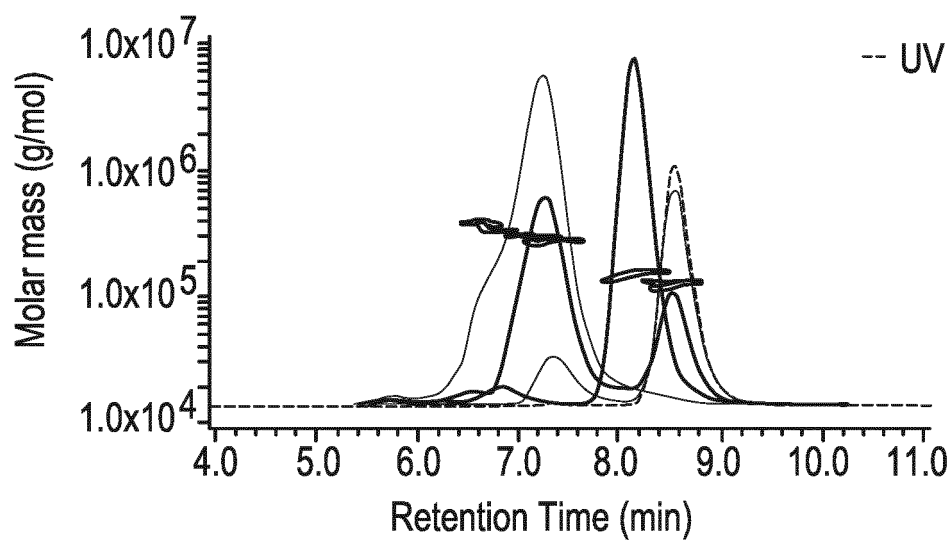
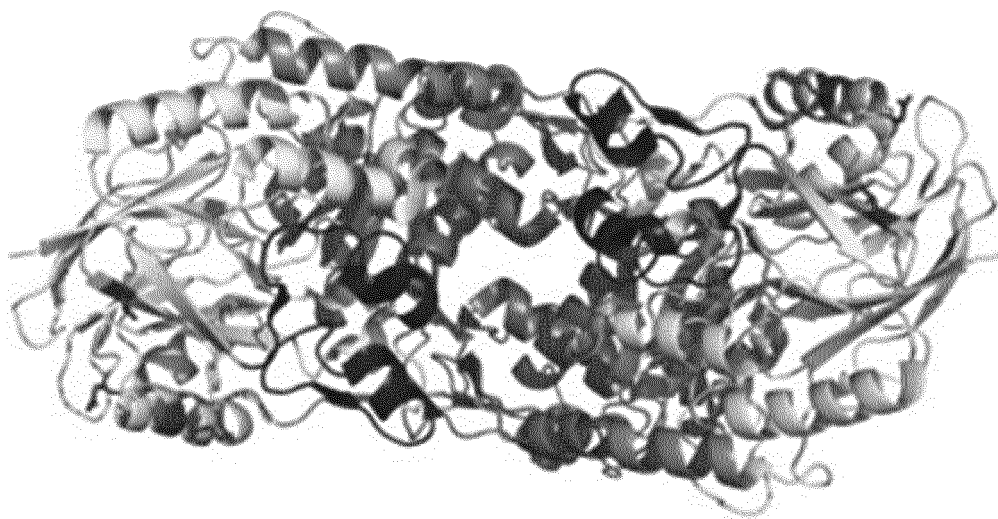


FIG. 30C



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FIG. 30B



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FIG. 31A

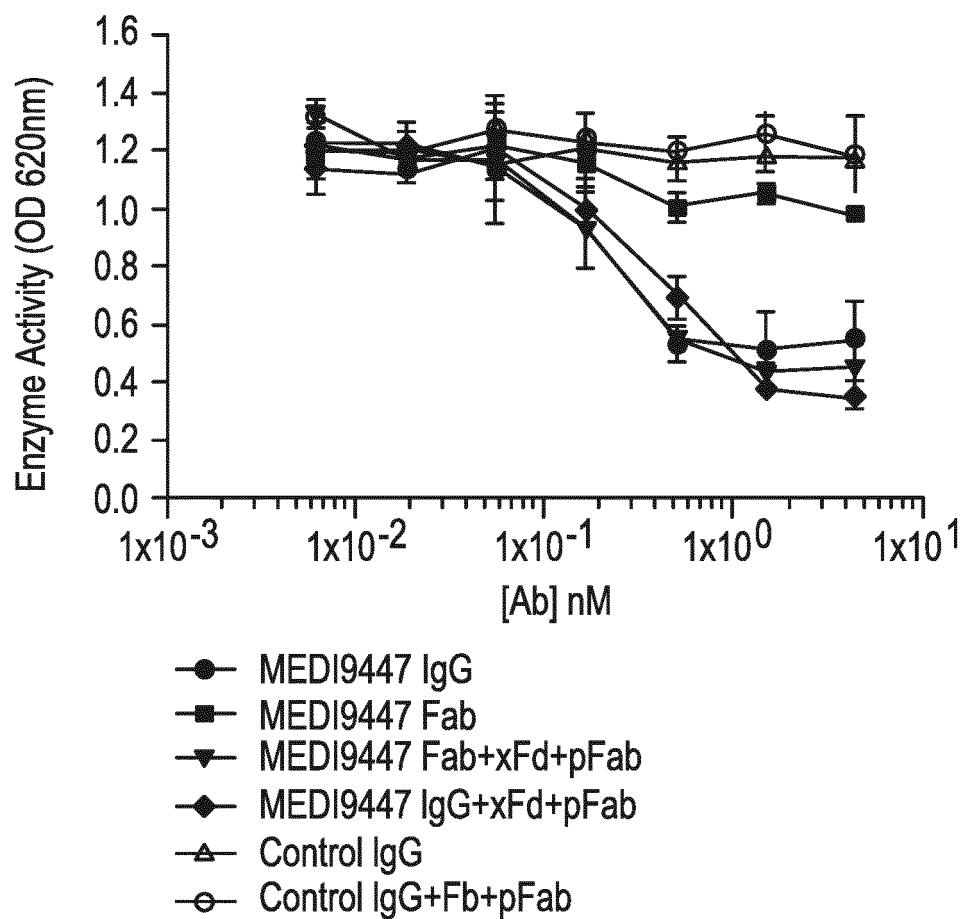
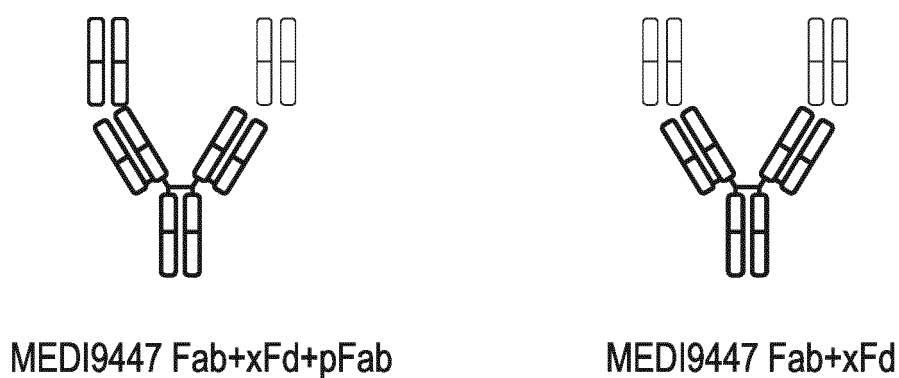


FIG. 31B



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FIG. 31C

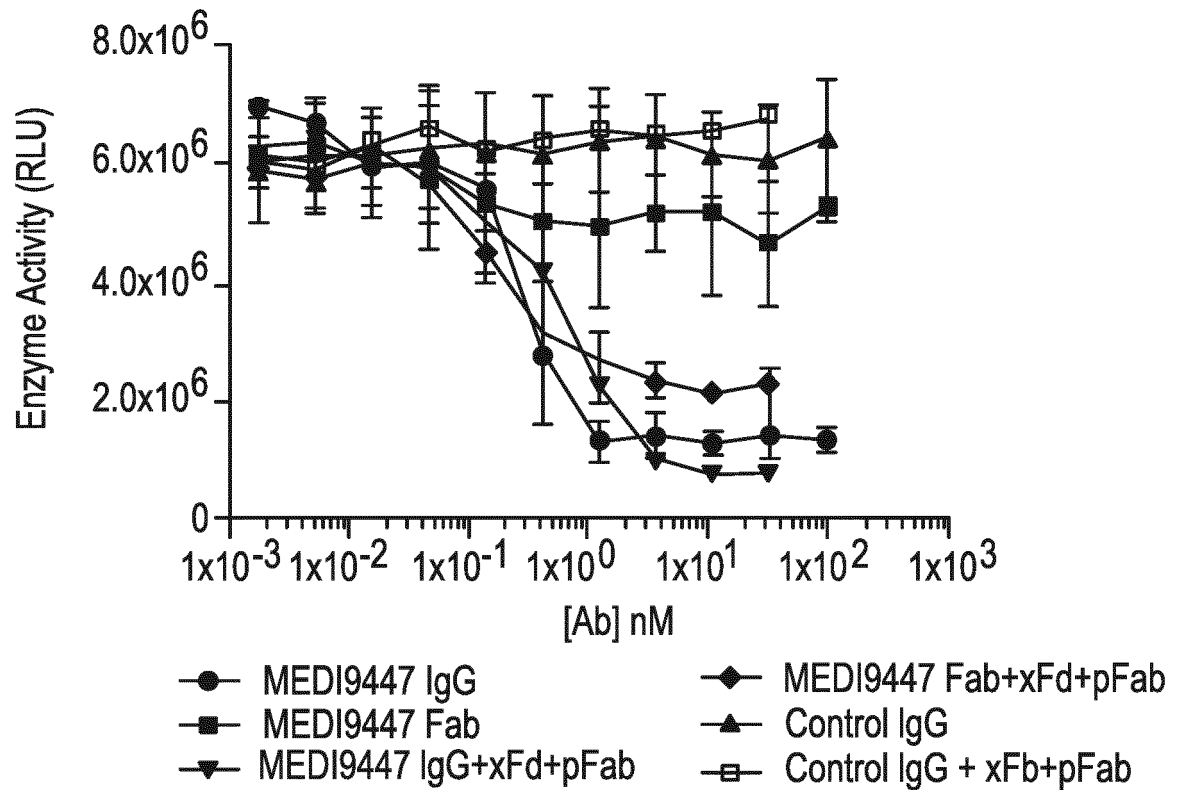
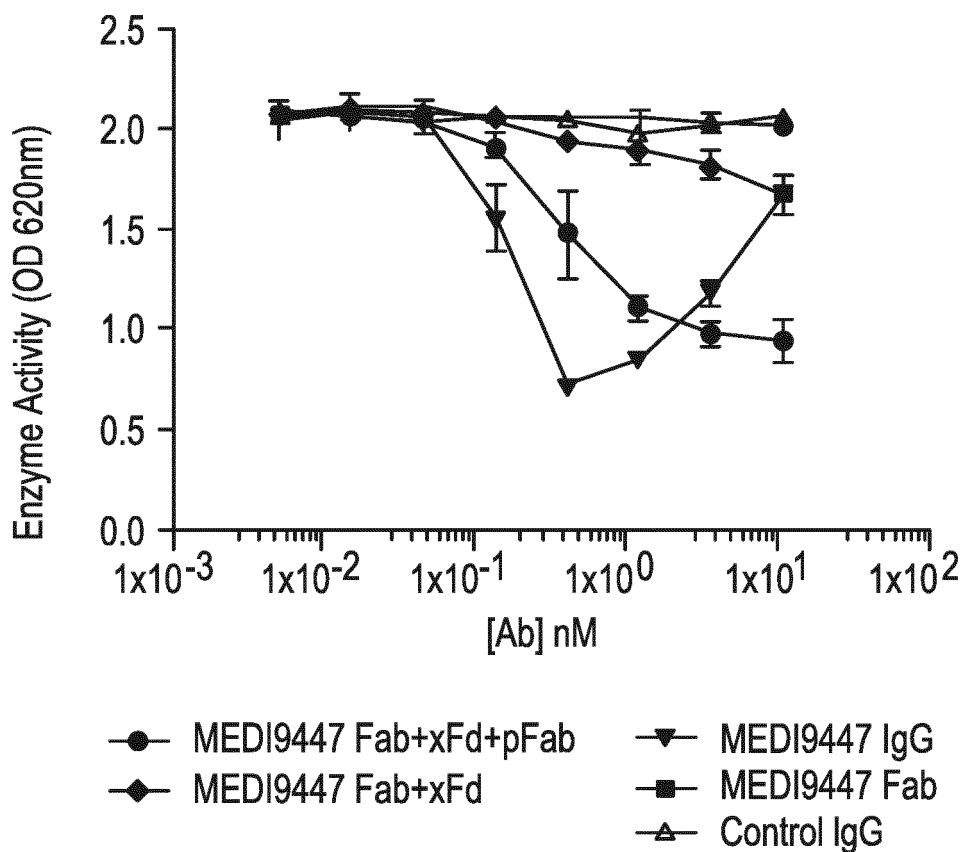


FIG. 31D



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FIG. 32

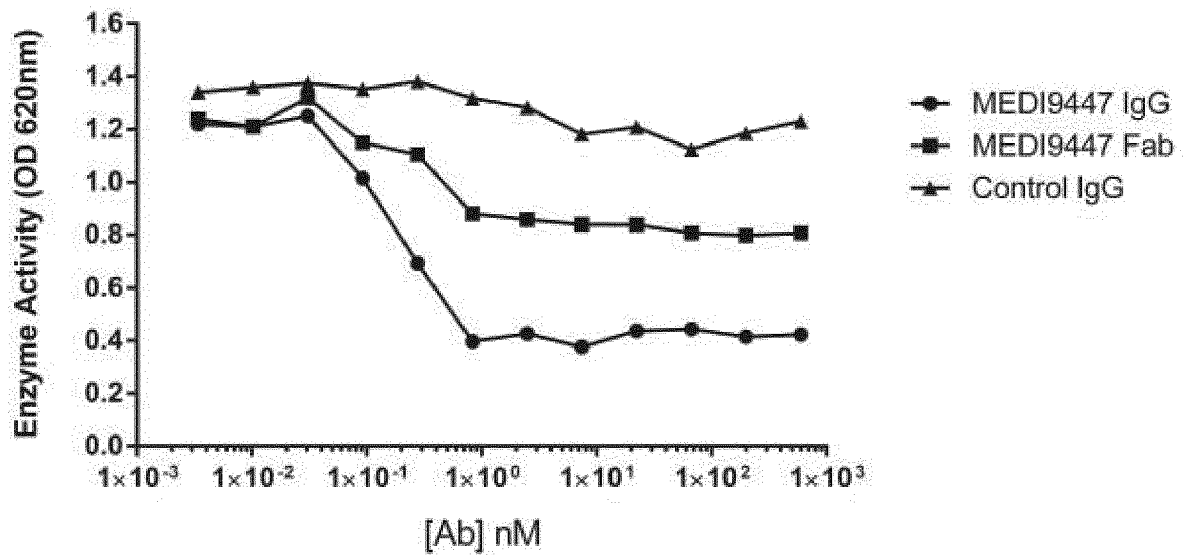


FIG. 33

