

FIG. 1

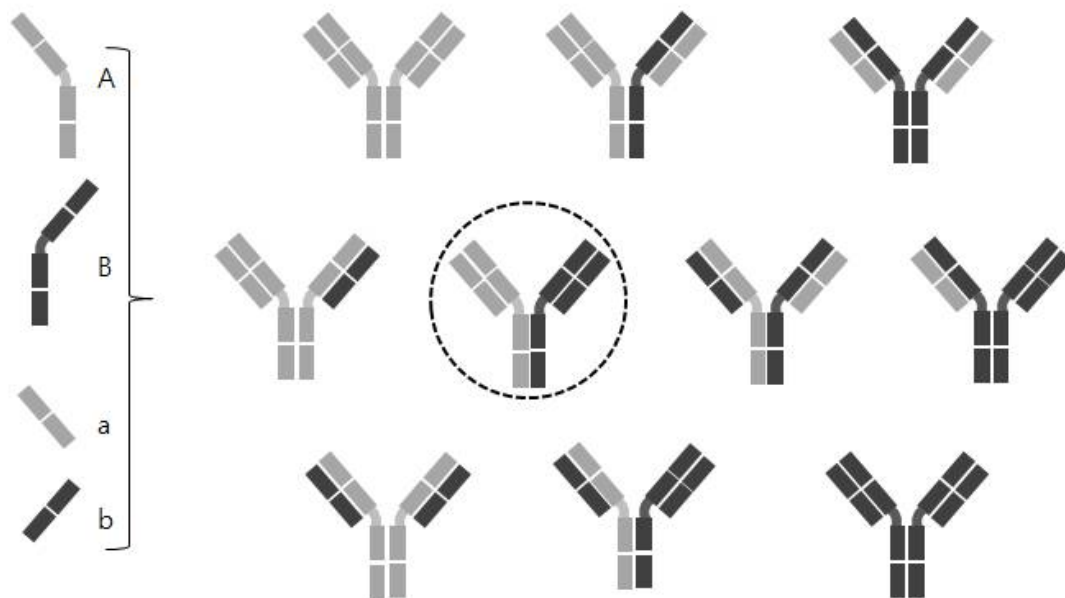


FIG. 2

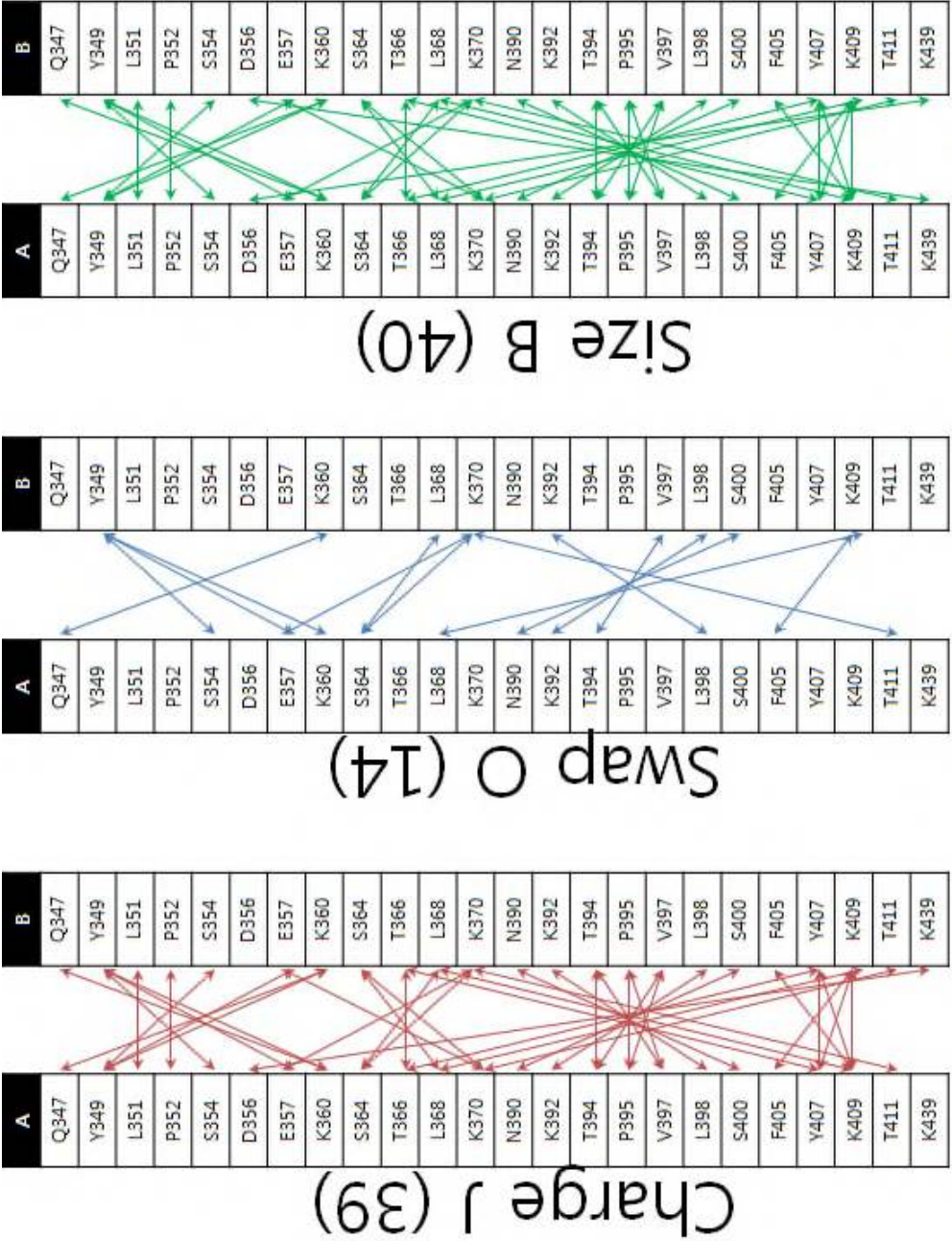


FIG. 3

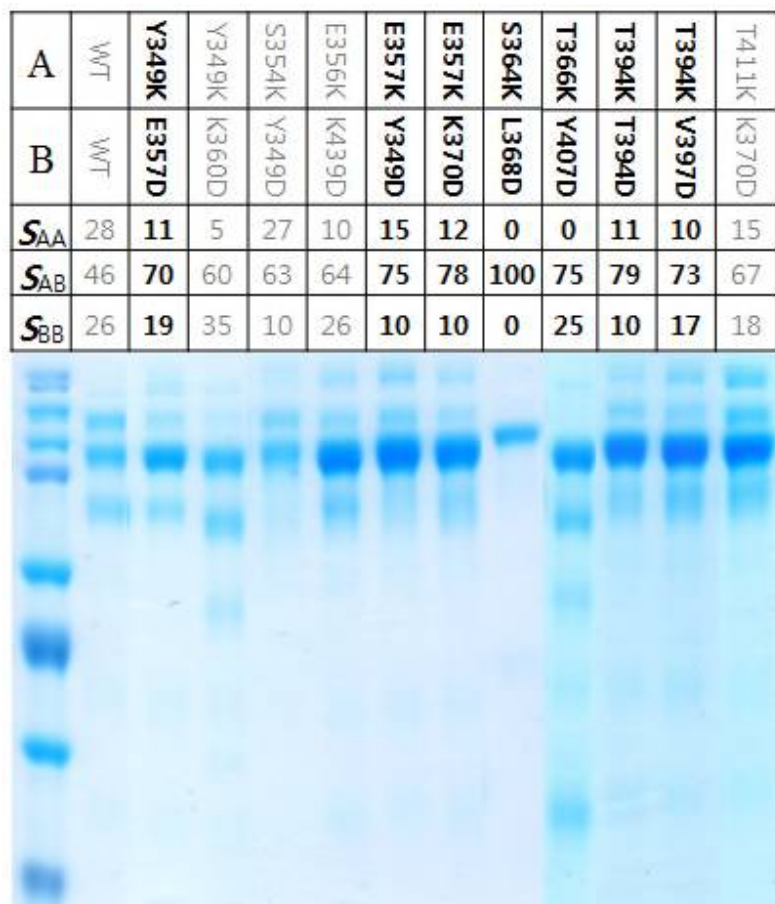


FIG. 4

A	E357Y	E357K	S364L	S364K	F405K	Y407T	T411K
B	Y349E	K370E	L368S	K370S	K409F	T366Y	K370T
S_{AA}	8	4	8	0	0	10	13
S_{AB}	71	80	61	90	70	83	60
S_{BB}	21	16	31	10	30	7	27

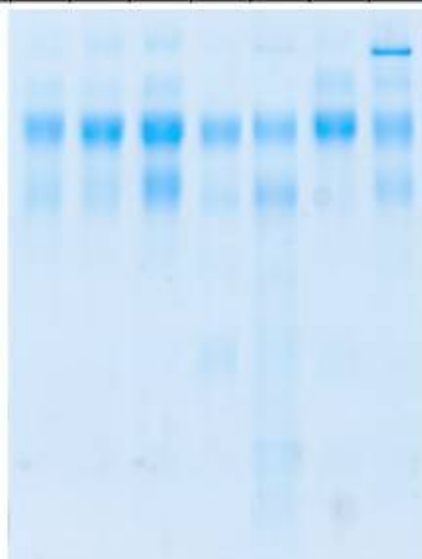


FIG. 5

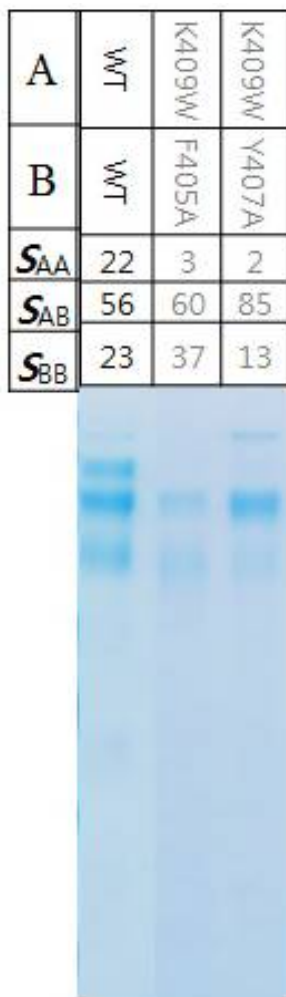


FIG. 6a

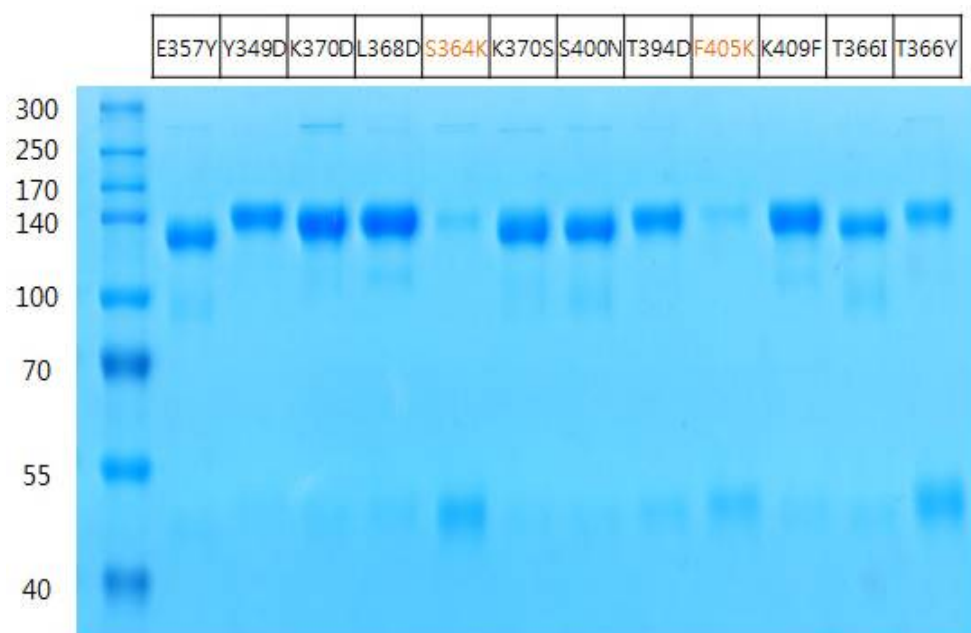


FIG. 6b

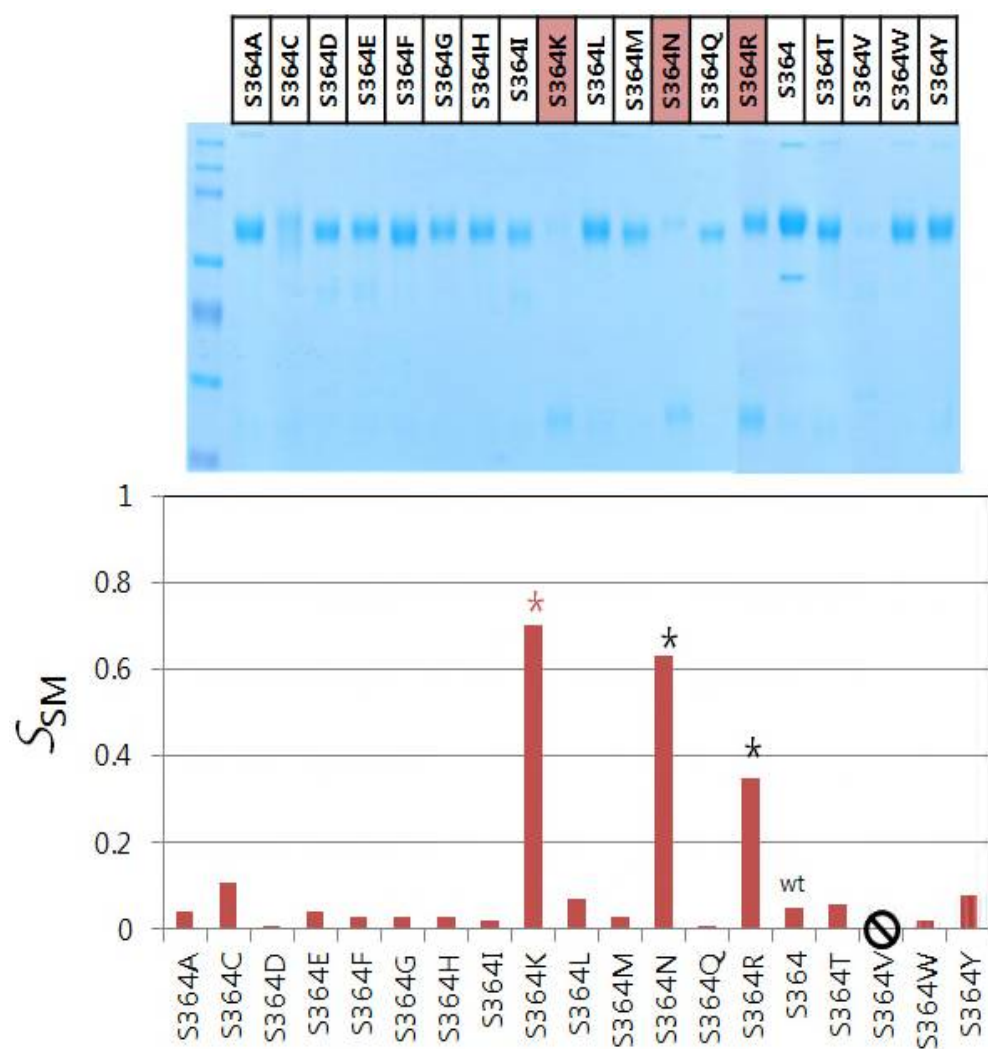


FIG. 6c

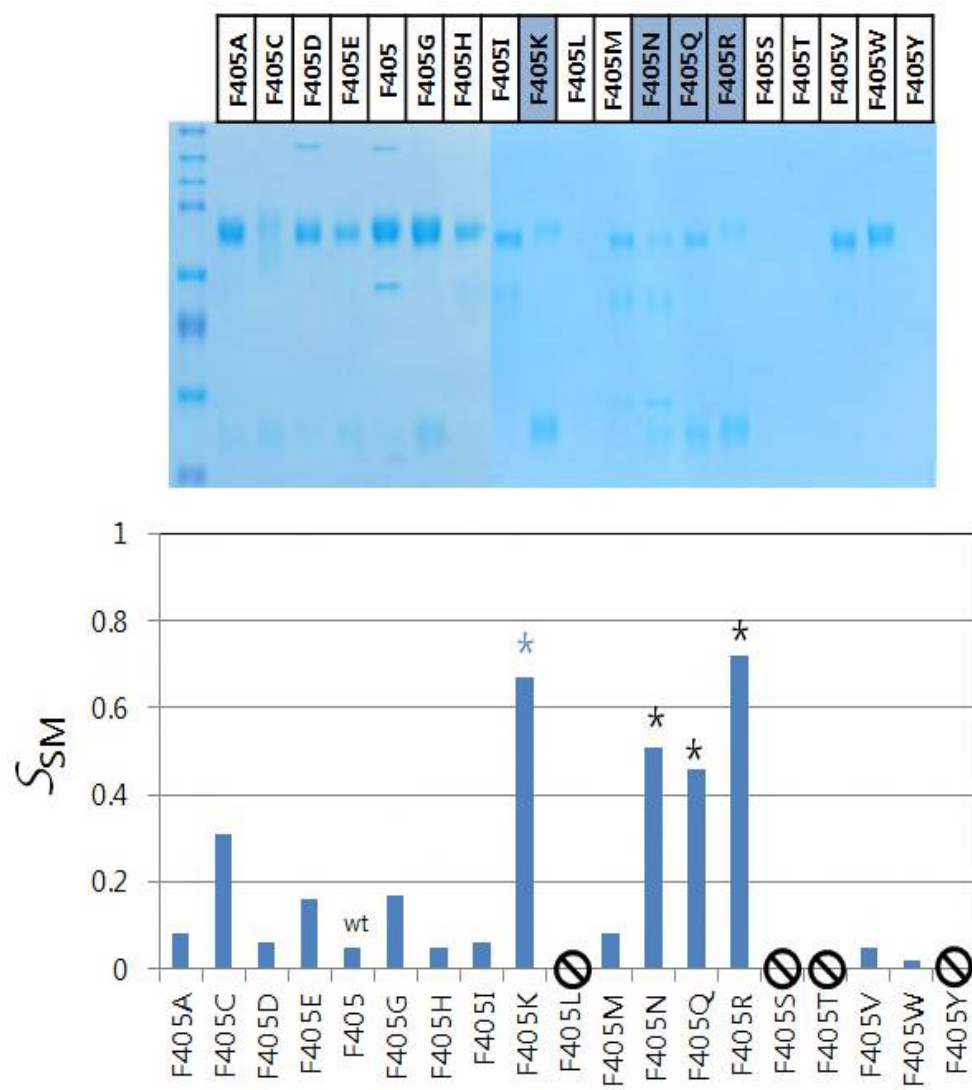


FIG. 6d

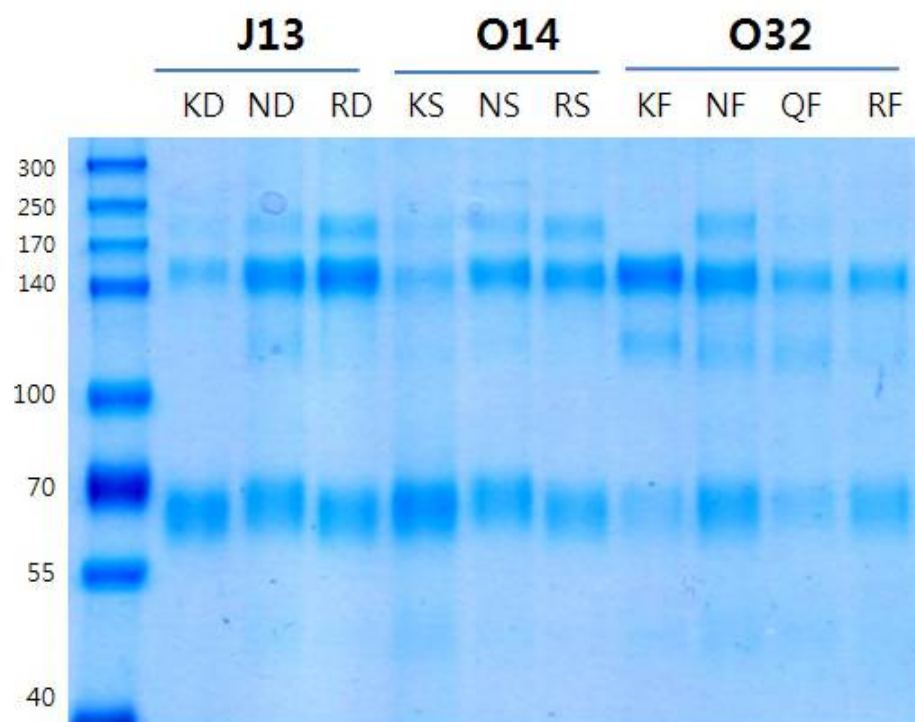


FIG. 7

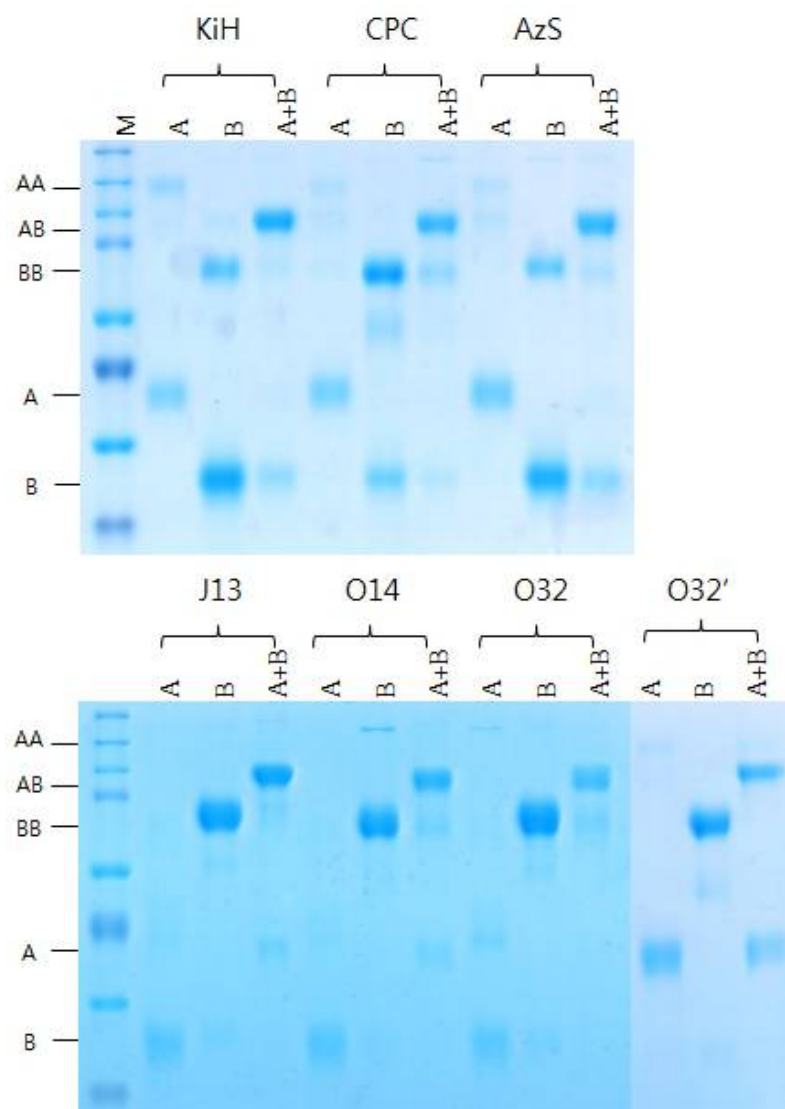


FIG. 8

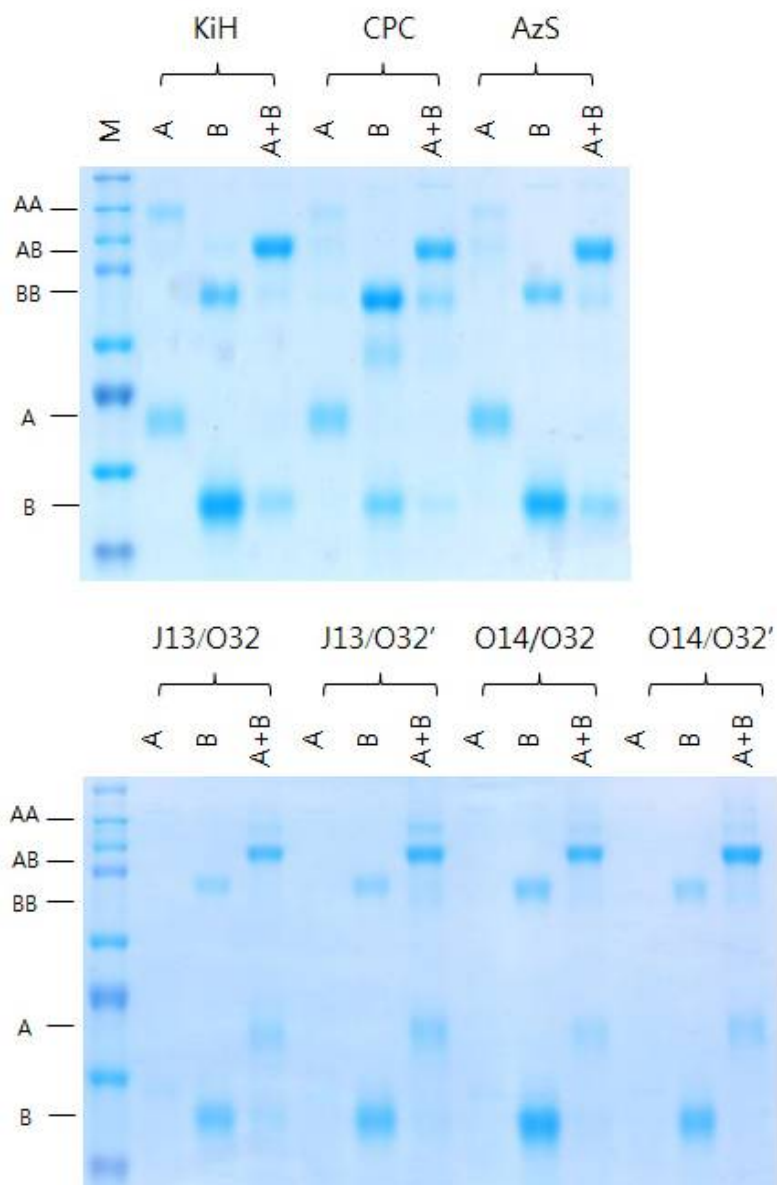


FIG. 9a



FIG. 9b

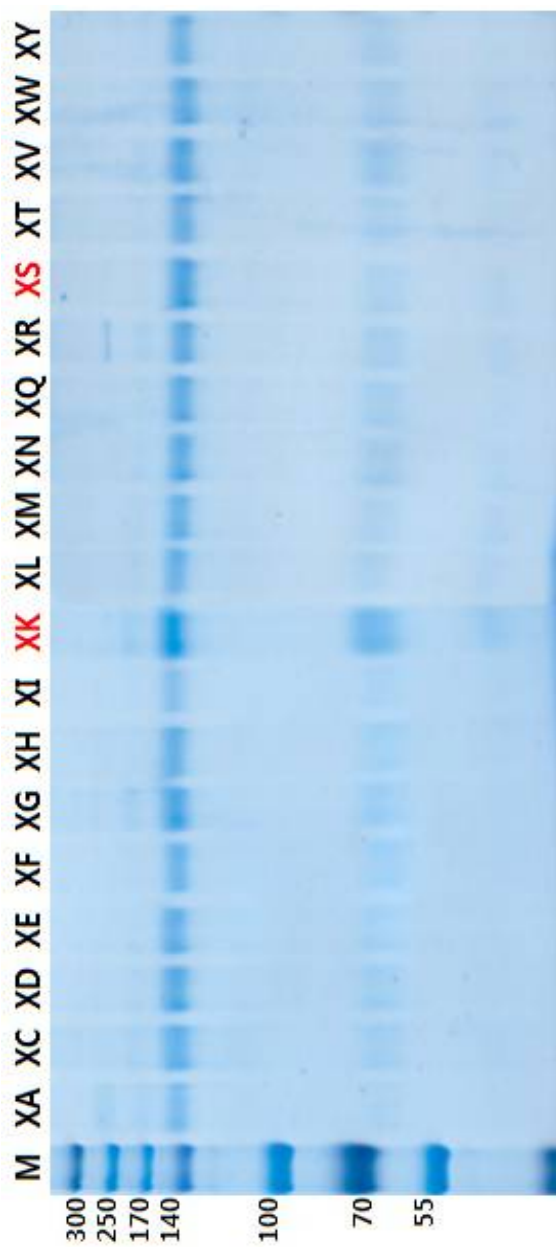
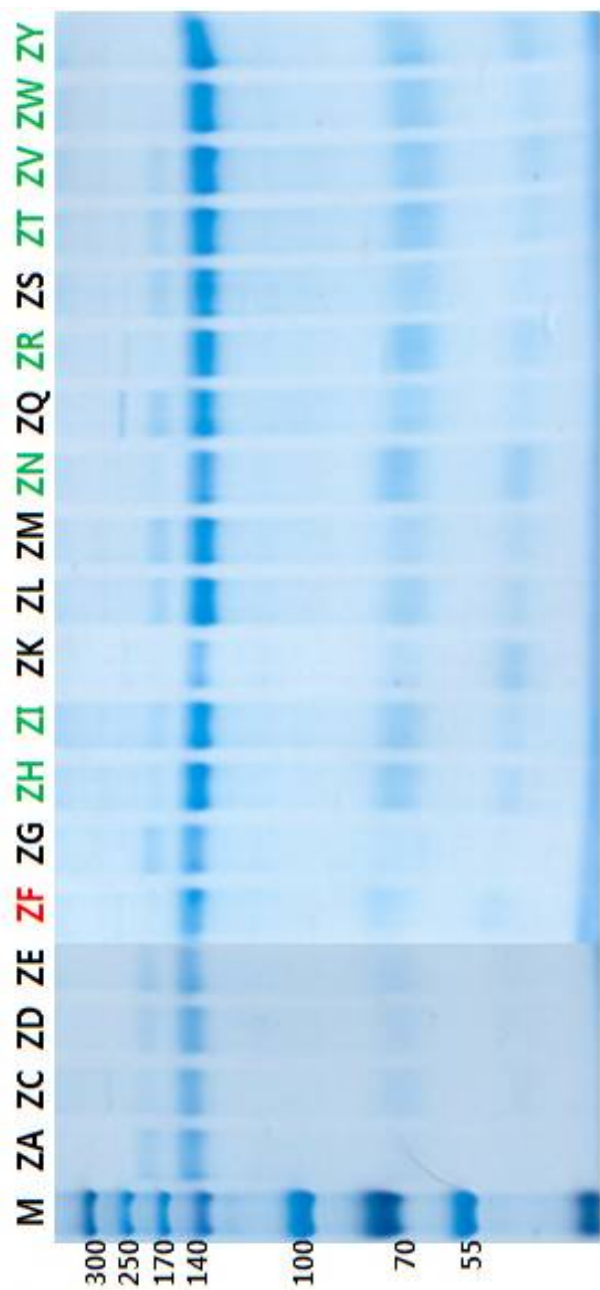


FIG. 9c





Charge Pairs

HC	LC
S35	Y36
I37	Q38
Q39	K42
L45	A43
W47	P44
W50	Y87
Y91	T96
W103	F98
Q105	F116
	F118
F126	P119
L128	S121
S131	Q124
K133	S127
T139	T129
A141	S131
L145	V133
K147	L135
H168	N137
F170	N138
P171	Q160
V173	S162
Q175	T164
S181	D167
S183	S174
V185	S176
T187	T178
	T180

Size Pairs

HC	LC
S35	Y36
I37	Q38
Q39	K42
L45	A43
W47	P44
W50	Y87
Y91	T96
W103	F98
Q105	F116
	F118
F126	P119
L128	S121
S131	Q124
K133	S127
T139	T129
A141	S131
L145	V133
K147	L135
H168	N137
F170	N138
P171	Q160
V173	S162
Q175	T164
S181	D167
S183	S174
V185	S176
T187	T178
	T180

Swap Pairs

HC	LC
S35	Y36
I37	Q38
Q39	K42
L45	A43
W47	P44
W50	Y87
Y91	T96
W103	F98
Q105	F116
	F118
F126	P119
L128	S121
S131	Q124
K133	S127
T139	T129
A141	S131
L145	V133
K147	L135
H168	N137
F170	N138
P171	Q160
V173	S162
Q175	T164
S181	D167
S183	S174
V185	S176
T187	T178
	T180

FIG. 10

Competitive Pairing (CPP) Assay

$$\begin{aligned} \text{CPP Score } (S^{\text{CPP}}) &= \frac{1}{2}(\mathcal{A}^{\text{CPP}} + \mathcal{B}^{\text{CPP}}) \\ \mathcal{A}^{\text{CPP}} &= 100(C_{aA}) / (C_{aA} + C_{aB}) = 100(C_A) / (C_A + C_B) \\ \mathcal{B}^{\text{CPP}} &= 100(C_{bB}) / (C_{bB} + C_{bA}) = 100(C_B) / (C_A + C_B) \end{aligned}$$

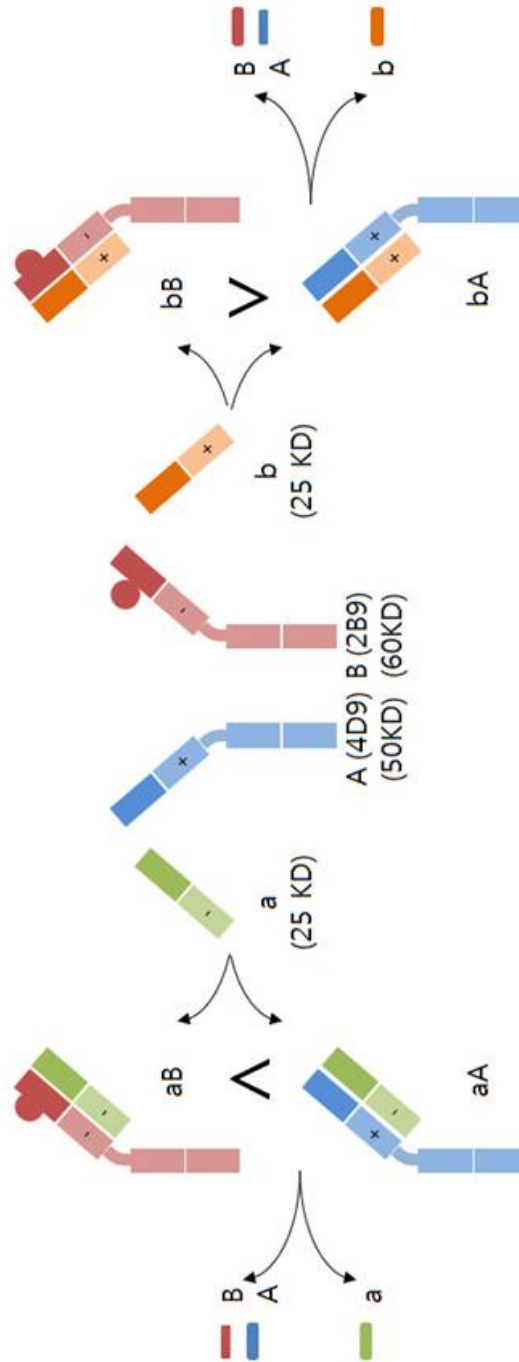
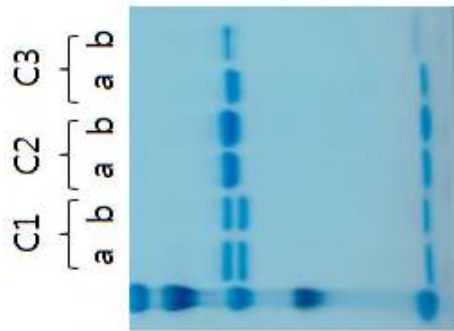


FIG. 11



- $$\text{CPP Score } (S^{\text{CPP}}) = \frac{1}{2}(a^{\text{CPP}} + b^{\text{CPP}})$$

$$a^{\text{CPP}} = 100(C_{aA})/(C_{aA} + C_{aB}) = 100(C_A)/(C_A + C_B)$$

$$b^{\text{CPP}} = 100(C_{bB})/(C_{bB} + C_{bA}) = 100(C_B)/(C_A + C_B)$$
- $$S^{\text{CPP}} = \begin{cases} 100 & \text{for positively productive pairing} \\ 0 & \text{for nonproductive or random pairing} \\ -100 & \text{for negatively productive pairing} \end{cases}$$

FIG. 12

	a	A (4D9)	B (2B9)	b	a^{CPP}	b^{CPP}	S^{CPP}
C1	A1R/Q38D/ L135Y/S176W	Q39K/S62E/ H172A/F174G	Q39Y/S62K	A1D/Q38R	0	0	0
C2	S121C/C214V	F126C/C220V	-	-	-100	100	0
C3	Q38D/A43D/ S176K	Q39K/Q105K/ S183D	Q39D/Q105D/ S183K	Q38K/A43K/ S176D	-100	100	0

FIG. 13

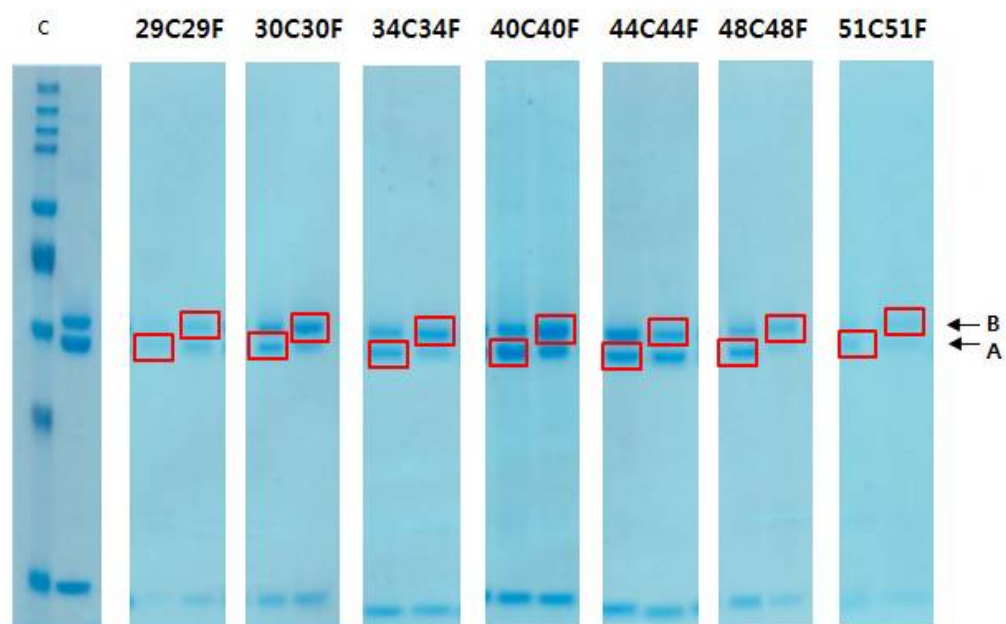


FIG. 14

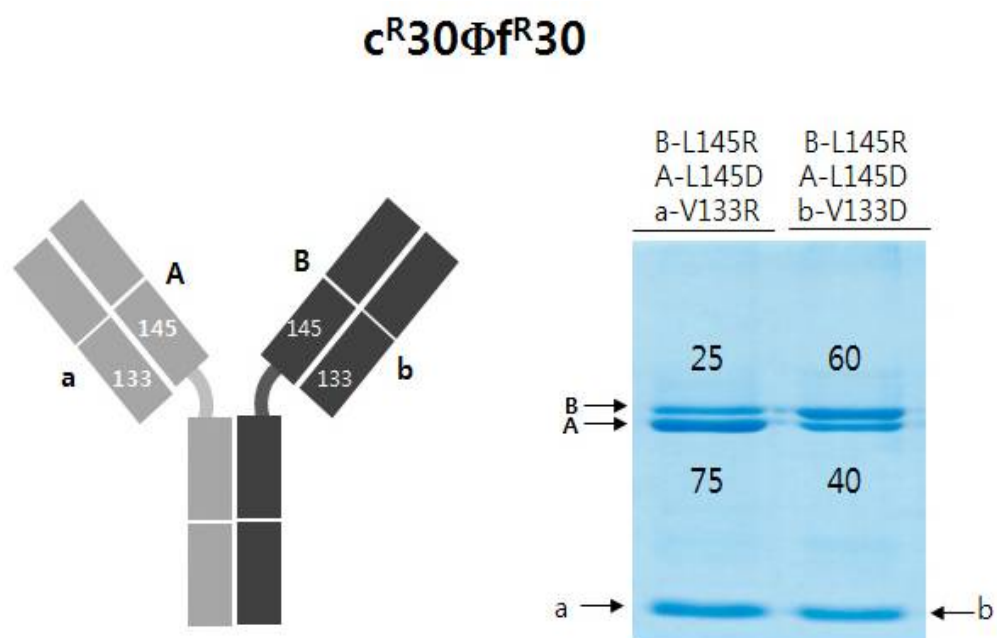


FIG. 15

c29c^R30Φf^R30

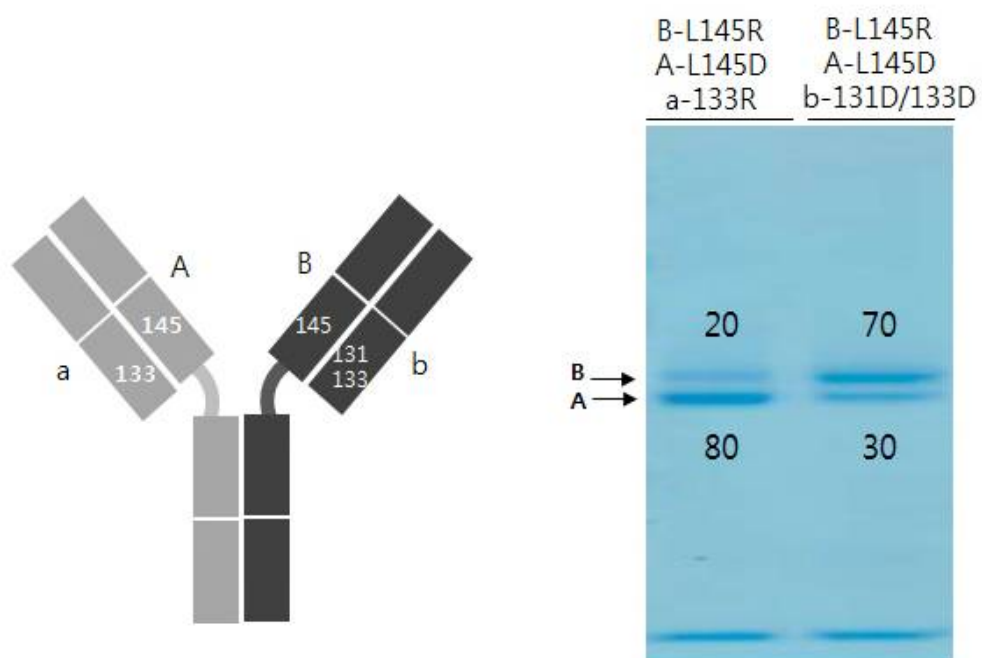


FIG. 16

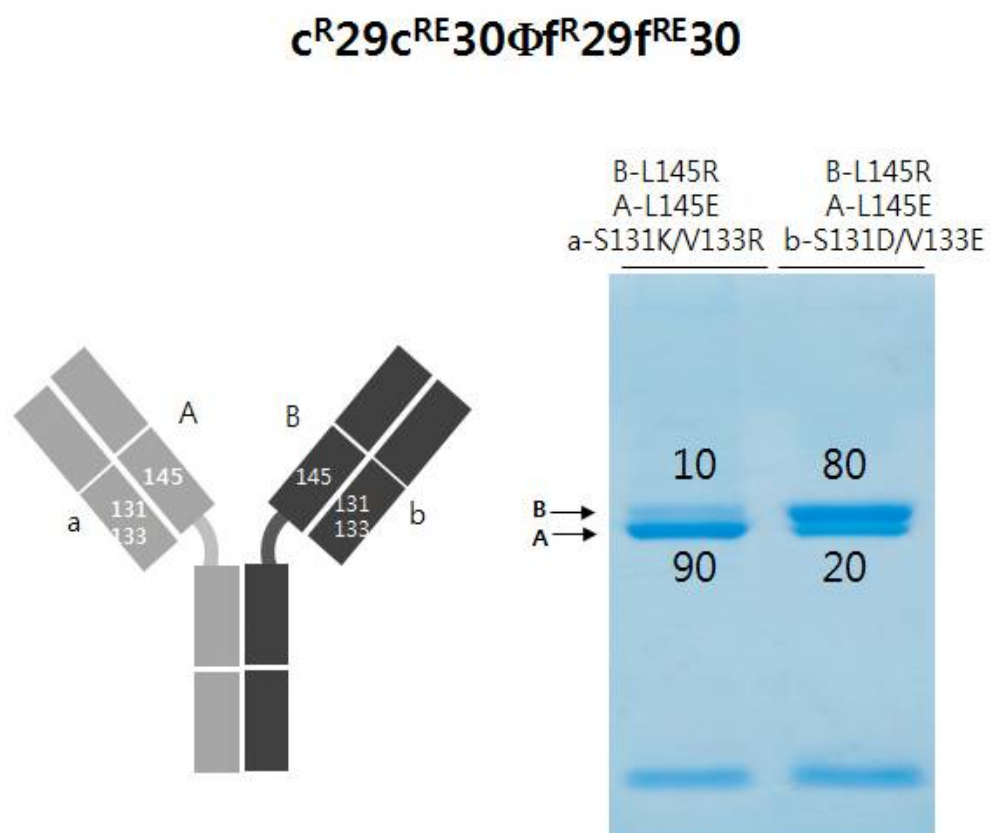


FIG. 17

c48Φf48

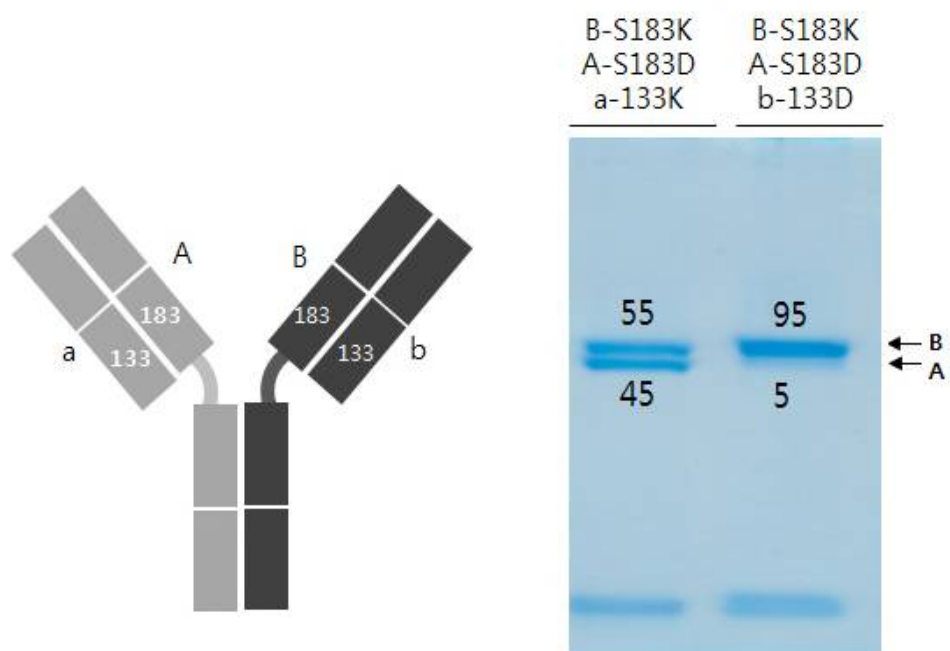


FIG. 18

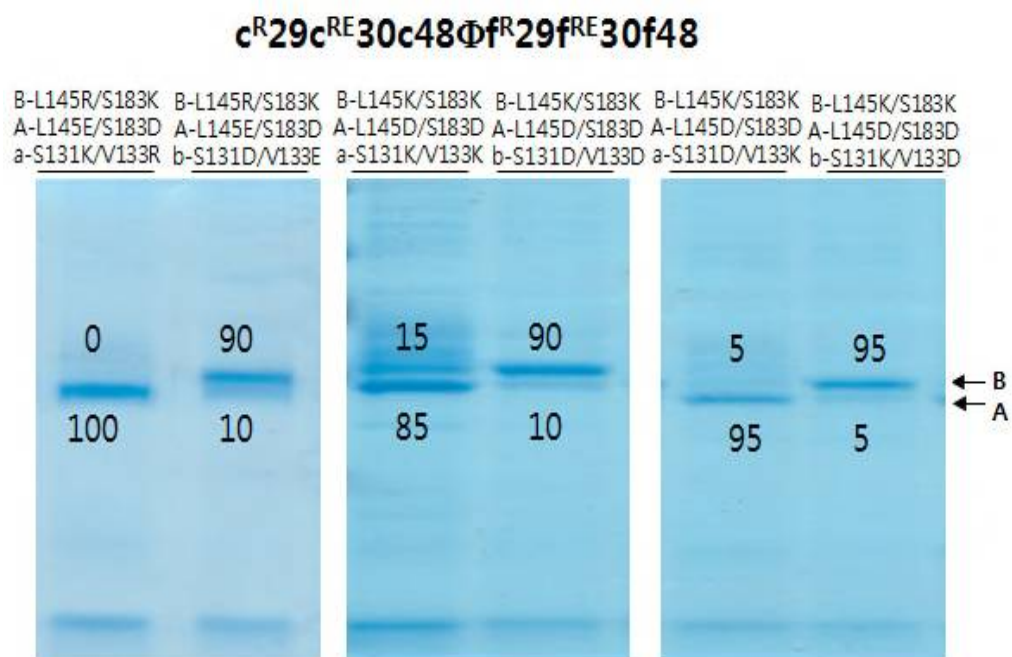


FIG. 19

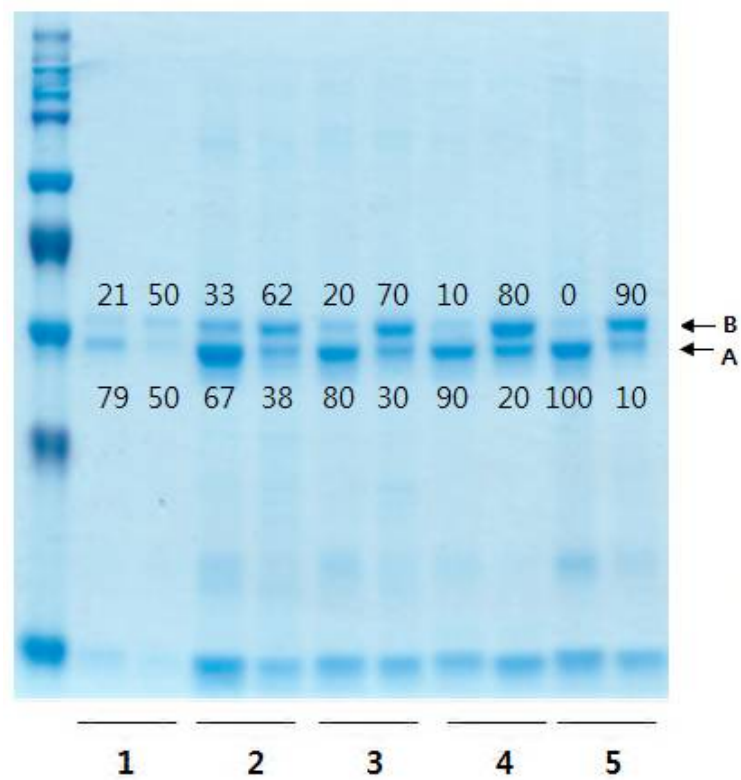


FIG.20

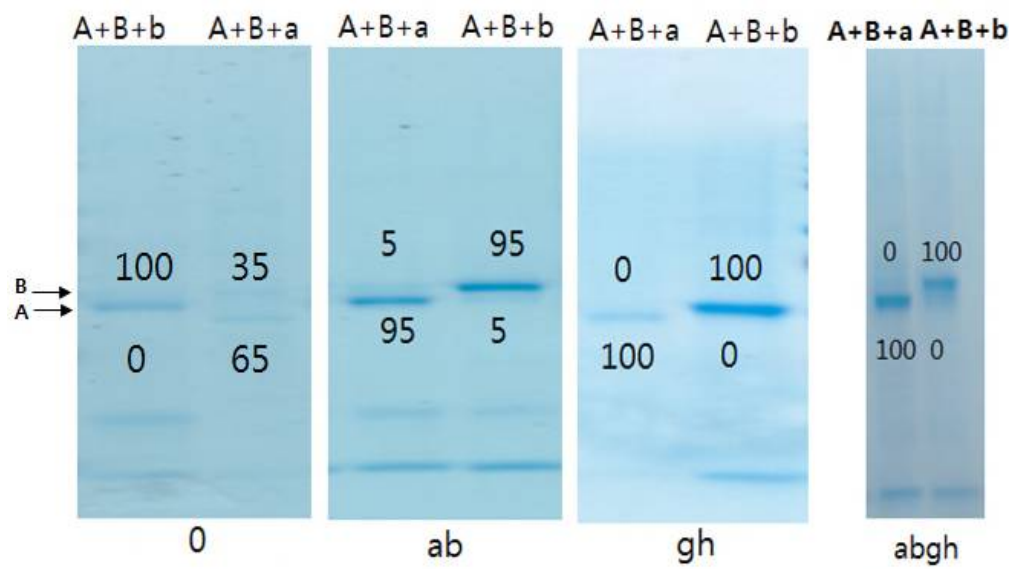


FIG. 21

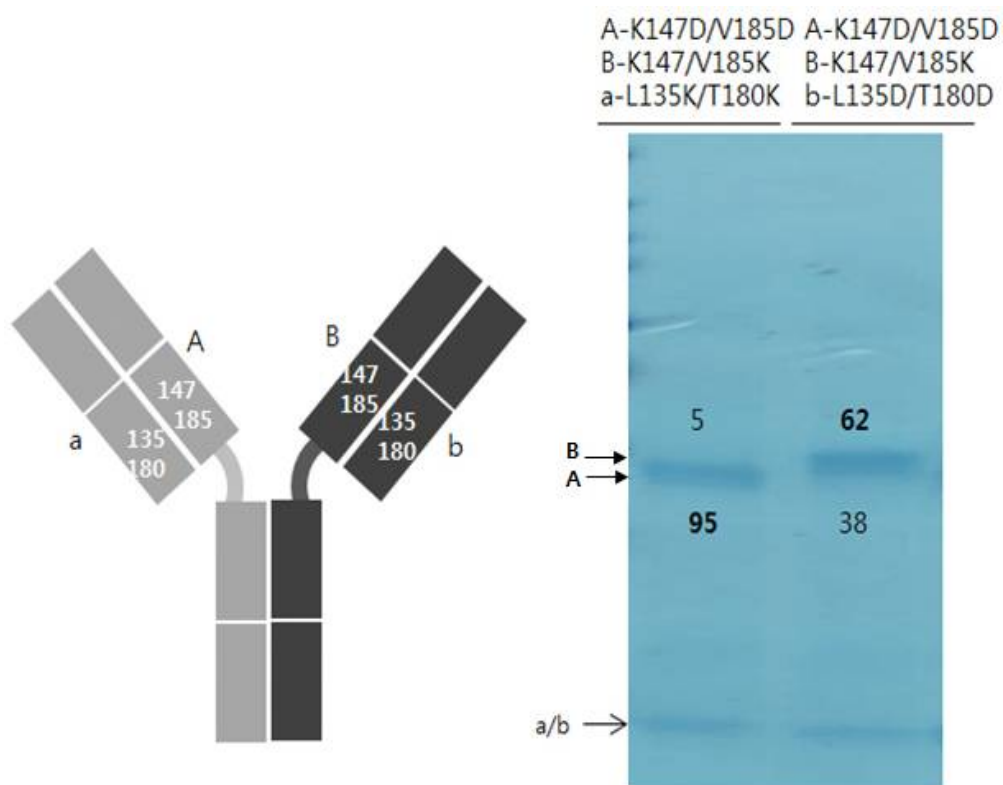
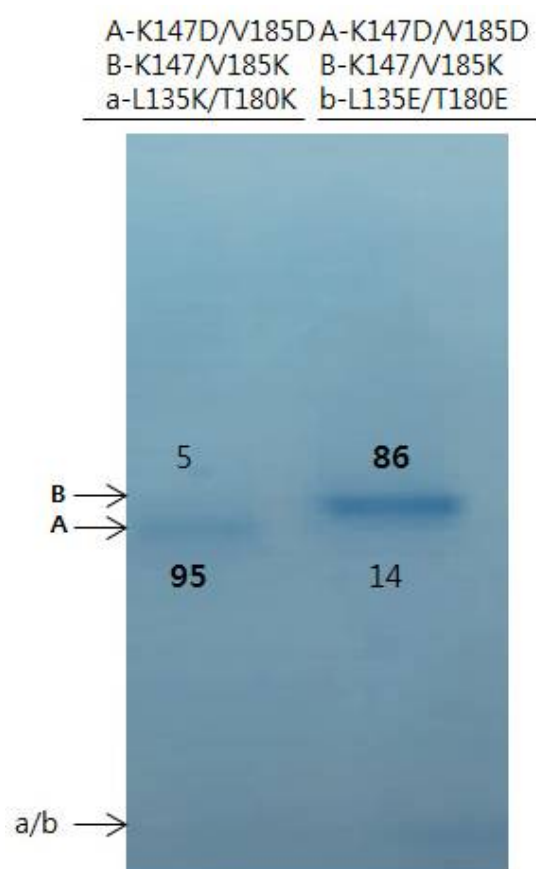
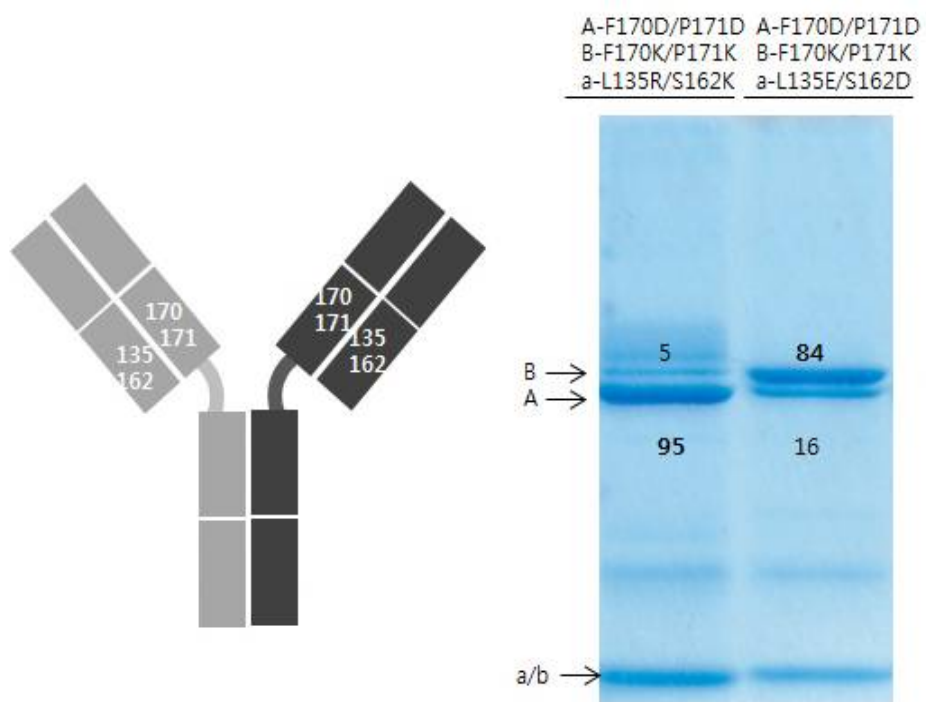


FIG. 22



c40Φf44



119

FIG. 24

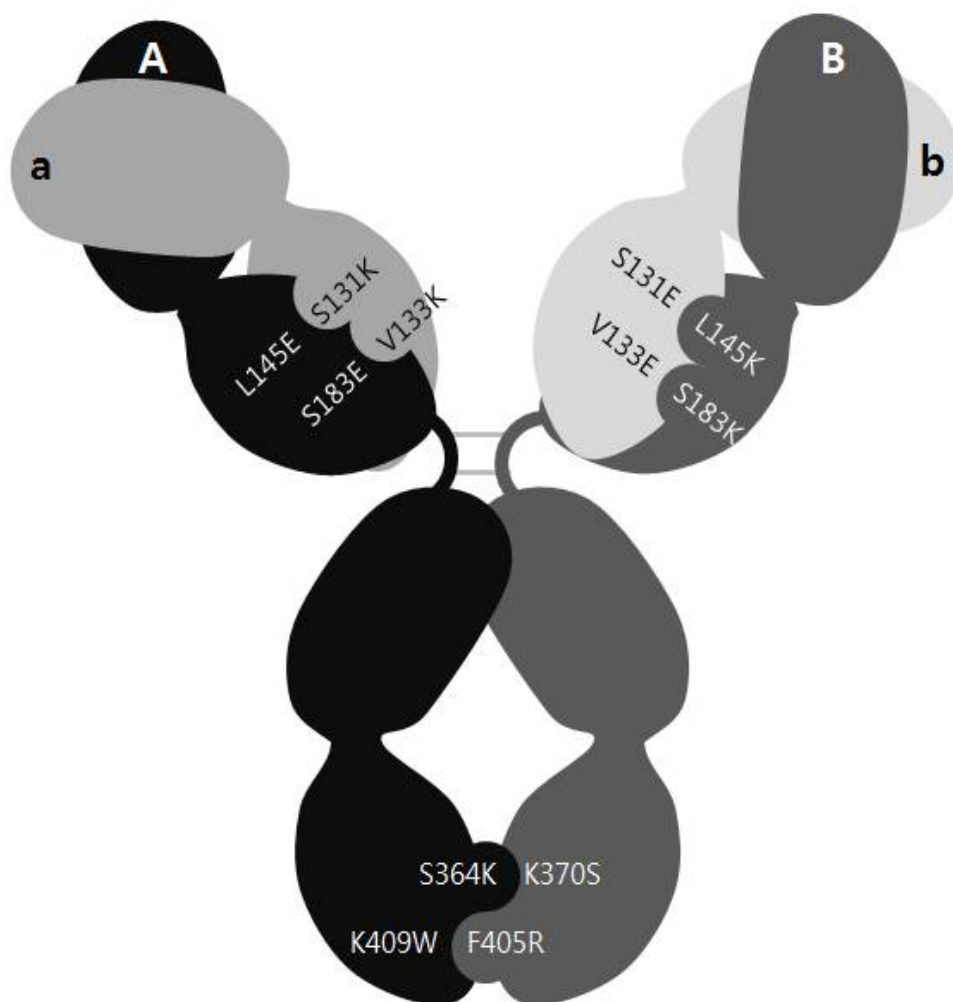


FIG. 25

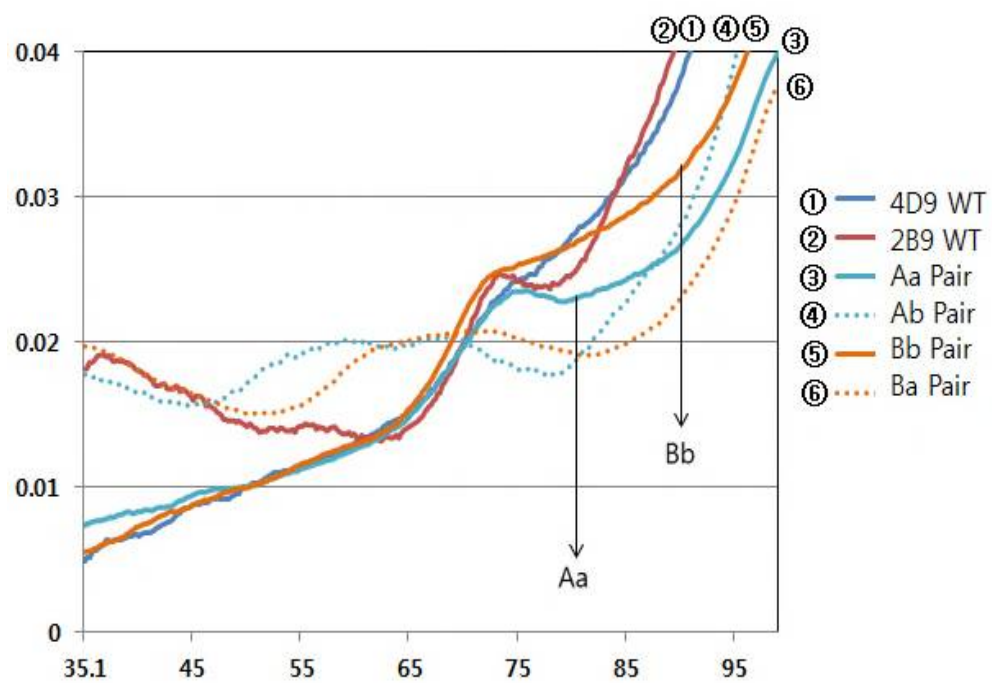


FIG. 26

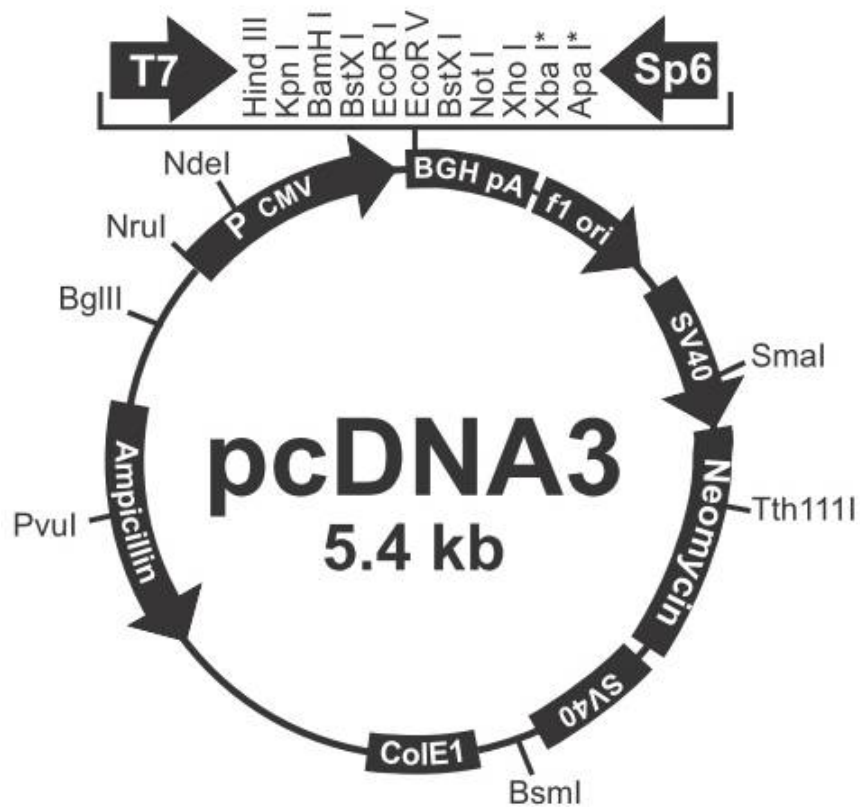


FIG. 27

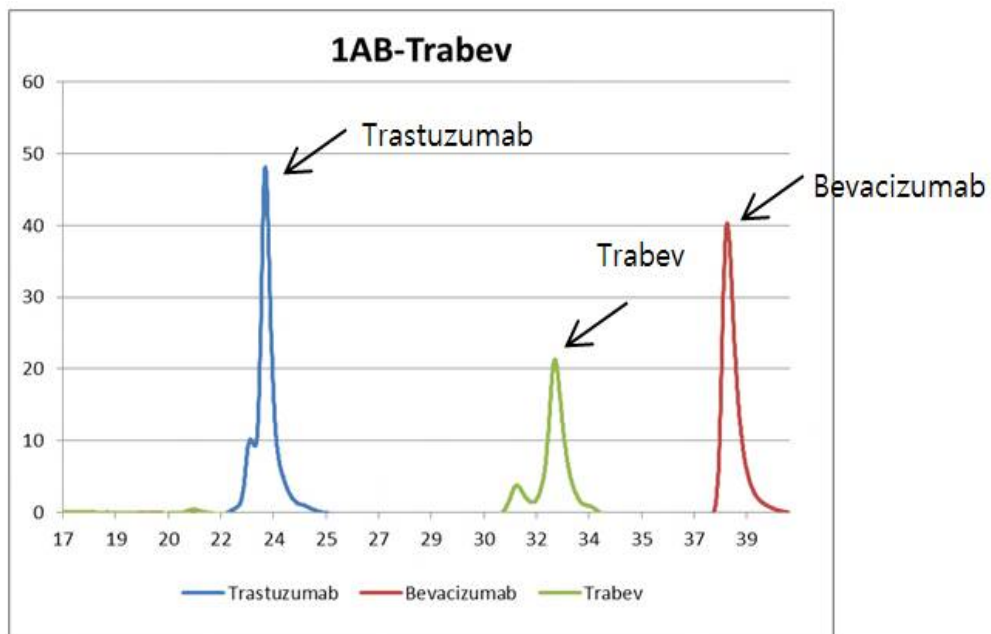
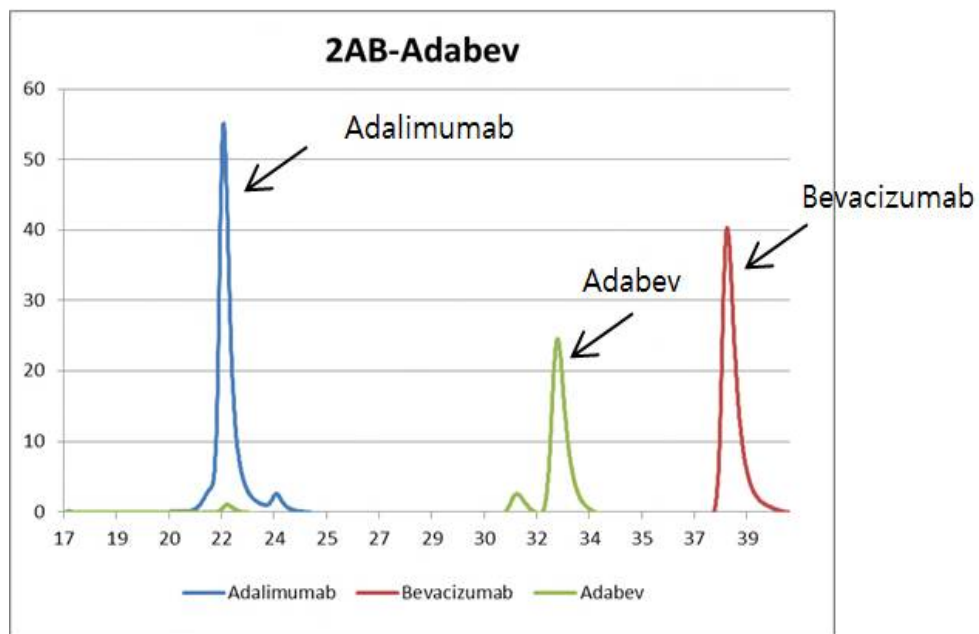


FIG. 28

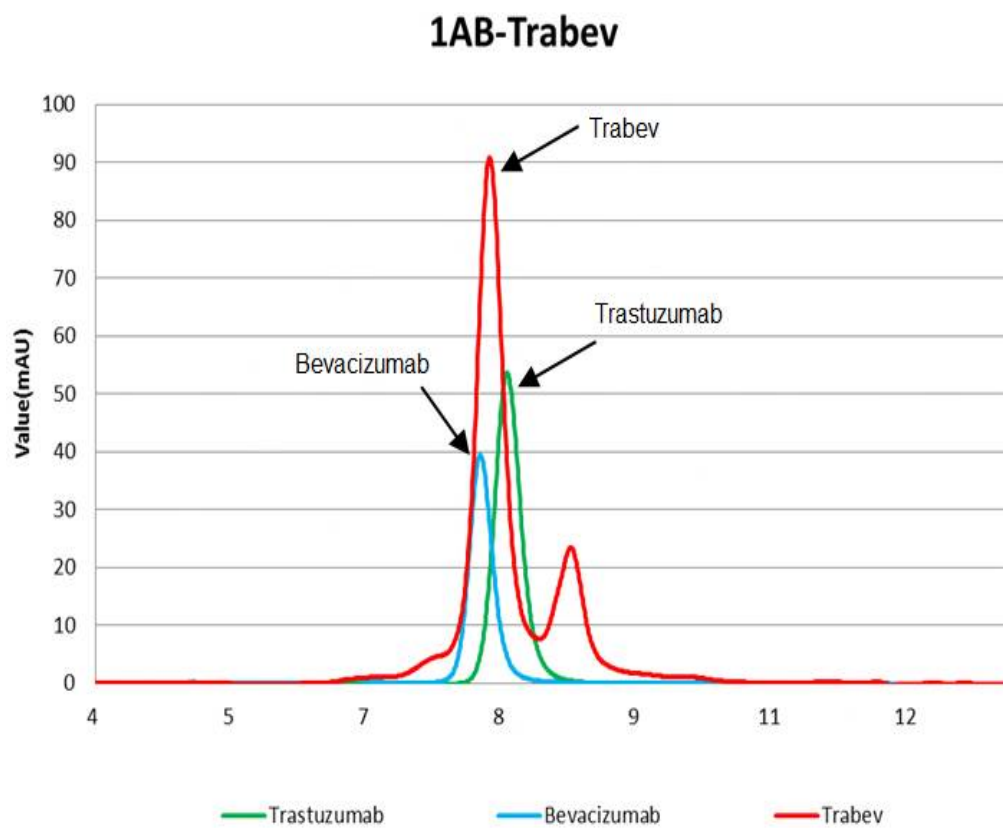


FIG. 29

2AB-Adabev

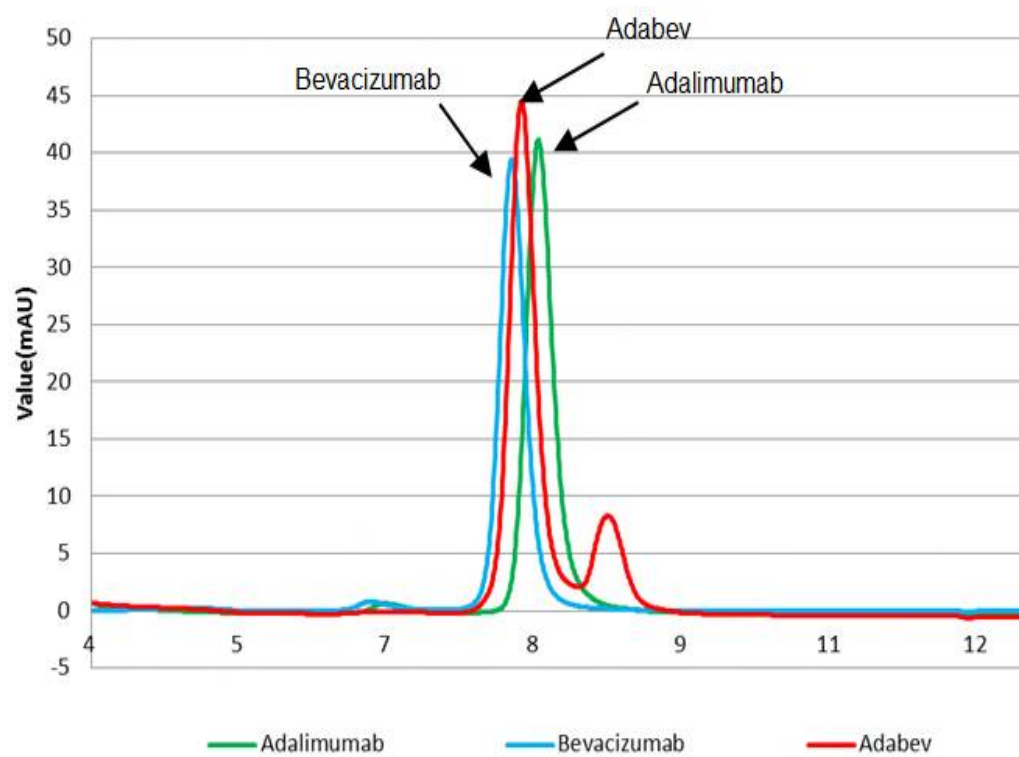


FIG. 30

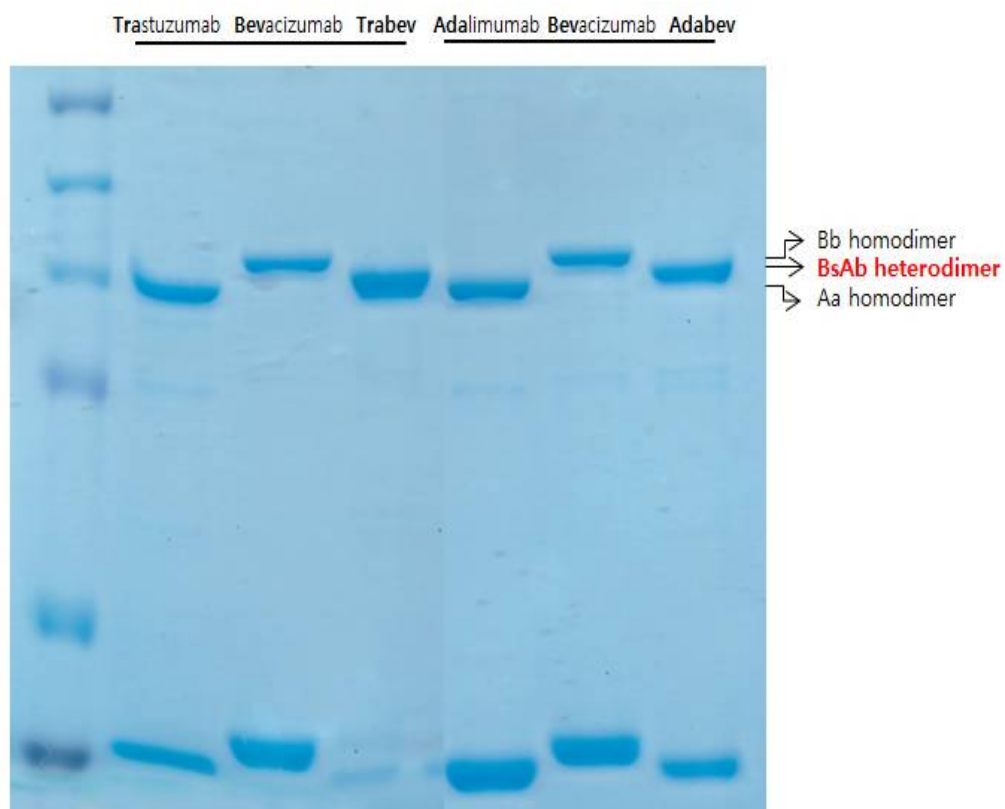


FIG. 31

Trabev

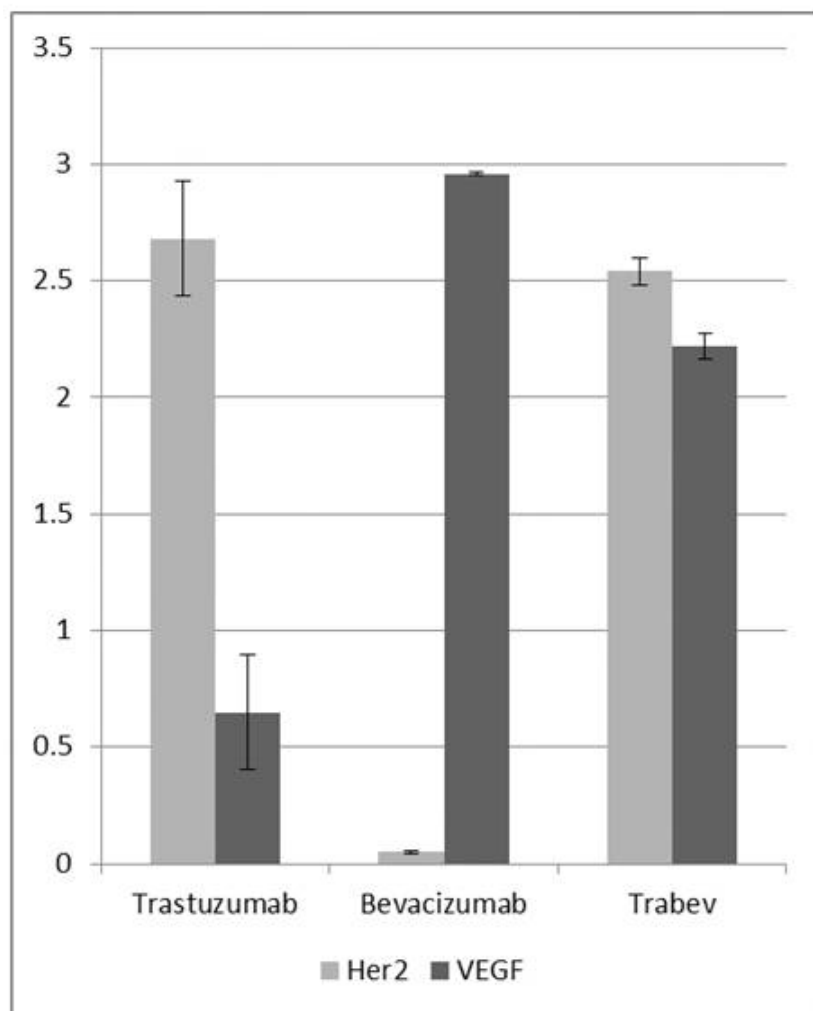


FIG. 32

Adabev

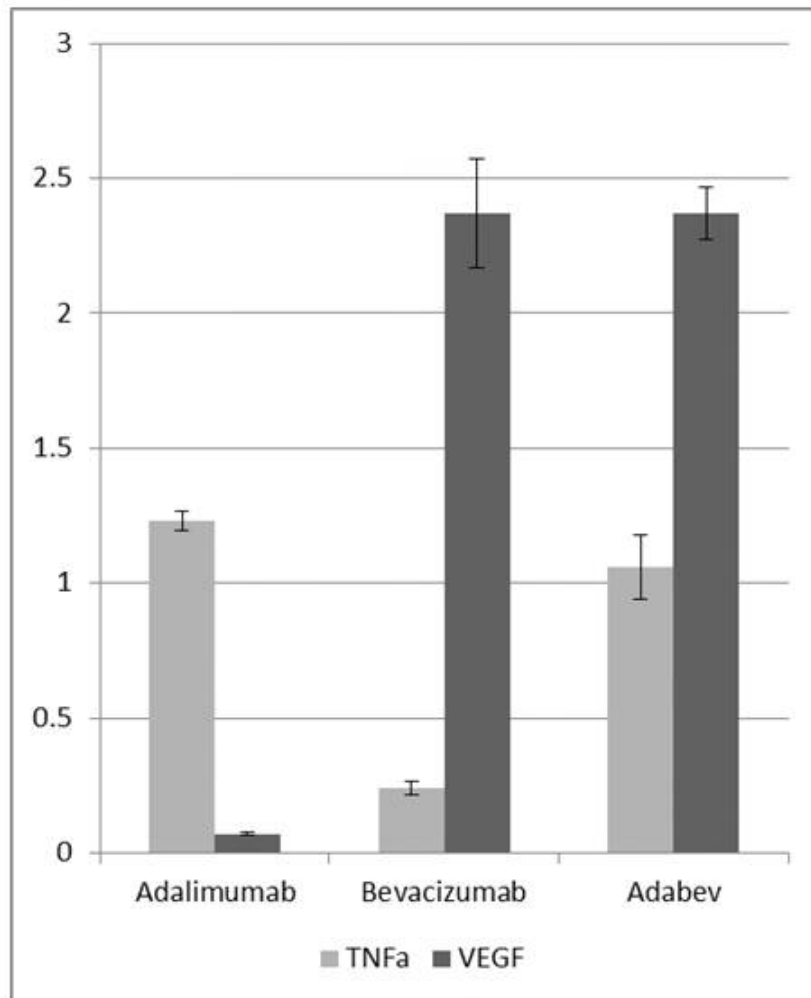


FIG. 33a

Query : Human IgG1 Heavy Constant
Subject : Human IgA1 Heavy Constant

Score	Expect	Method	Identities	Positives	Gaps
125 bits(315)	7e-38	Compositional matrix adjust.	108/341(32%)	159/341(46%)	17/341(4%)
Query 1	ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFP-EPVTVSWNSGALTSGVHTFPAVLQ	59			
Sbjct 1	AS P VFPL+ S + G + CLV+ +FP EP++V+W+ FP +	59			
Query 60	SG-LYSLSSVVTVPSSS-LGTQTYICNVNH--KPSNTKVDKRVKSCDKTHTCPPCPAP	115			
Sbjct 60	SG LY+ SS +T+P++ L ++ C+V H PS P + P	119			
Query 116	ELLGGPSVFLFFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPR	175			
Sbjct 120	PSCCHPRLSLHRPALEDLLLGSEA-NLTCTLTGL-RDASGVTFWTTPSSGK--SAVQGPP	175			
Query 176	EEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTL	235			
Sbjct 176	ERDLGCGYSVSSVLPGCAEPWNHGRFTFTCTAAYPESKTPLTATLSKS-GNTFRPEVHLLP	234			
Query 236	PSRDELTKNQ-VSLTCLVSGFYPSDIAVEWESNGQ--PENNYKTTPPVLD-SDG--SFEL	289			
Sbjct 235	PPSEELALNELVLTCLAGFSPKDVLRWLQGSQELPREKYLTVASRQEPSQGTTFV	294			
Query 290	YSRLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK	330			
Sbjct 295	TSILRVAAEDWKKGDTFSCMVGHEALPLAFTQKTIDRLAGK	335			

K409 S364 K370 F405

FIG. 33b

Query : Human Immunoglobulin Light chain (Kappa)

Subject : Human Immunoglobulin Light chain (Lambda)

Score	Expect	Method	Identities	Positives	Gaps
151 bits(382)	2e-50	Compositional matrix adjust.	90/233(39%)	138/233(59%)	12/233(5%)
Query 7	VIMLLLLWVSGTCGDILLTQSPAILSVSPGERVSFSCRASQFVGSSIHWHYQQRTNGSPRL	66			
	+ + +L + +G+ LTQ P ++SVSPG+ S +C + + WYQ + SP L				
Sbjct 6	LFLGVLAYCTGSVASVELTQ-PPLVSVSPGQTASITCSGDRLGDNACWYQLKPGQSPVL	64			
Query 67	LIKYASEMSGIPSRFSGSGSGTDFTLISINTVESEDIADYYCQ---QSHSWPFTFGSGTN	123			
	+I + SGIP R SGS SG TL+I+ ++ D A+YVCQ S SW FG GT				
Sbjct 65	VIIQDNRRPSGIPERISGSNSGNTATLTISGTQAMDEAEYVCQAWDSSTSW--VFGGGK	122			
Query 124	LEV-KRTVAAPSVFIFPPSDEQLKSGTASVCLLNNFYFPREKQVQWKVDNA-LQSGNSQE	181			
	L V + AAPSV +FPPS E+L++ A++VCL+++FYP V WK D++ +++G E				
Sbjct 123	LTVLGQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAG--VE	180			
Query 182	SVTEQDSKDSSTYLSSTLTLSKADYERHKVYACEVTHQGLSSPVTKSFNRGEC	234			
	+ T ++ Y+ SS L+L+ ++ H+ Y+C+VTH+G S V K+ EC				
Sbjct 181	TTTPSKQSNKYYAASSYLSLTPEQWKSHRSYSCQVTHEG--STVEKTVAPTEC	231			

S131 & V133

FIG. 33c

C _H 1 Sequences		L145	S183
Human IgG1	ASTKGPSVFPPLAPSSKSTSGGTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSSLGTQTTCNVNHHKPSNTKVDKKV
Human IgG2	ASTKGPSVFPPLAPCSRSTSESTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVDDHPSNTKVDKTV
Human IgG3	ASTKGPSVFPPLAPCSRSTSGGTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSSLGTQTTCNVNHHKPSNTKVDKRV
Human IgG4	ASTKGPSVFPPLAPCSRSTSESTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSSLGTQTTCNVDDHPSNTKVDKRV
Mouse IgG1	AKTTPPSVYPLAPGSAAQTNMVTILGCLWKGYFPEPVTVTWNSGSLSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Mouse IgG2 ^{a,b}	AKTTAPSVYPLAPVCGGTGSSVTILGCLWKGYFPEPVTILTNWNSGSLSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Mouse IgG2 ^a	AKTTAPSVYPLAPVCGDTGSSVTILGCLWKGYFPEPVTILTNWNSGSLSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Mouse IgG2 ^b	AKTTPPSVYPLAPCGGDTGSSVTSGCLWKGYFPEPVTVTWNSGSLSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKL
Mouse IgG3	TTTAPSVYPLVPGCSDTSGSSVTILGCLWKGYFPEPVTWKWNYGALSSGVHTVSSVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Rat IgG1	AETTAPSVYPLAPGTALKSNMVTILGCLWKGYFPEPVTVTWNSGALSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Rat IgG2 ^a	AETTAPSVYPLAPGTALKSNMVTILGCLWKGYFPEPVTVTWNSGALSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI
Rat IgG2 ^b	AQTTAPSVYPLAPCGGDTTSSVTILGCLWKGYFPEPVTVTWNSGALSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKV
Rat IgG2 ^c	ATTAPSVYPLVPGCSGTSGSLVTILGCLWKGYFPEPVTWKWNSGALSSGVHTFPVAVLQSSGLYSLS		SSVTVTPSSNFGTQTTCNVVHPSNTKVDKKI

FIG. 33d

C _H 3 Sequences		S364 K370	F405 K409
Human IgG1	QQPREQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Human IgG2	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Human IgG3	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Human IgG4	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Mouse IgG1	GRKAPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Mouse IgG2 ^{a,b}	GRKAPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Mouse IgG2 ^a	GRKAPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Mouse IgG2 ^b	GRKAPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Mouse IgG3	GRKAPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Rat IgG1	GRTQVPHVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Rat IgG2 ^a	GTPRGQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Rat IgG2 ^b	GLVRKQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		
Rat IgG2 ^c	GKARTPQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPVLDSDGSFPLYSKLTVDKSRWQQGNVPSCSVMHEALHNHYTQKSLSLSPGK		

FIG. 34

c34Φf51

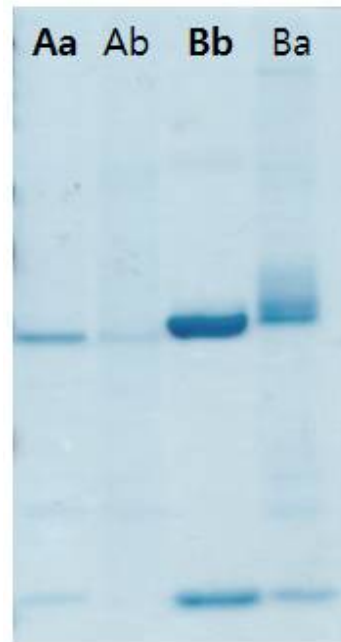


FIG. 35

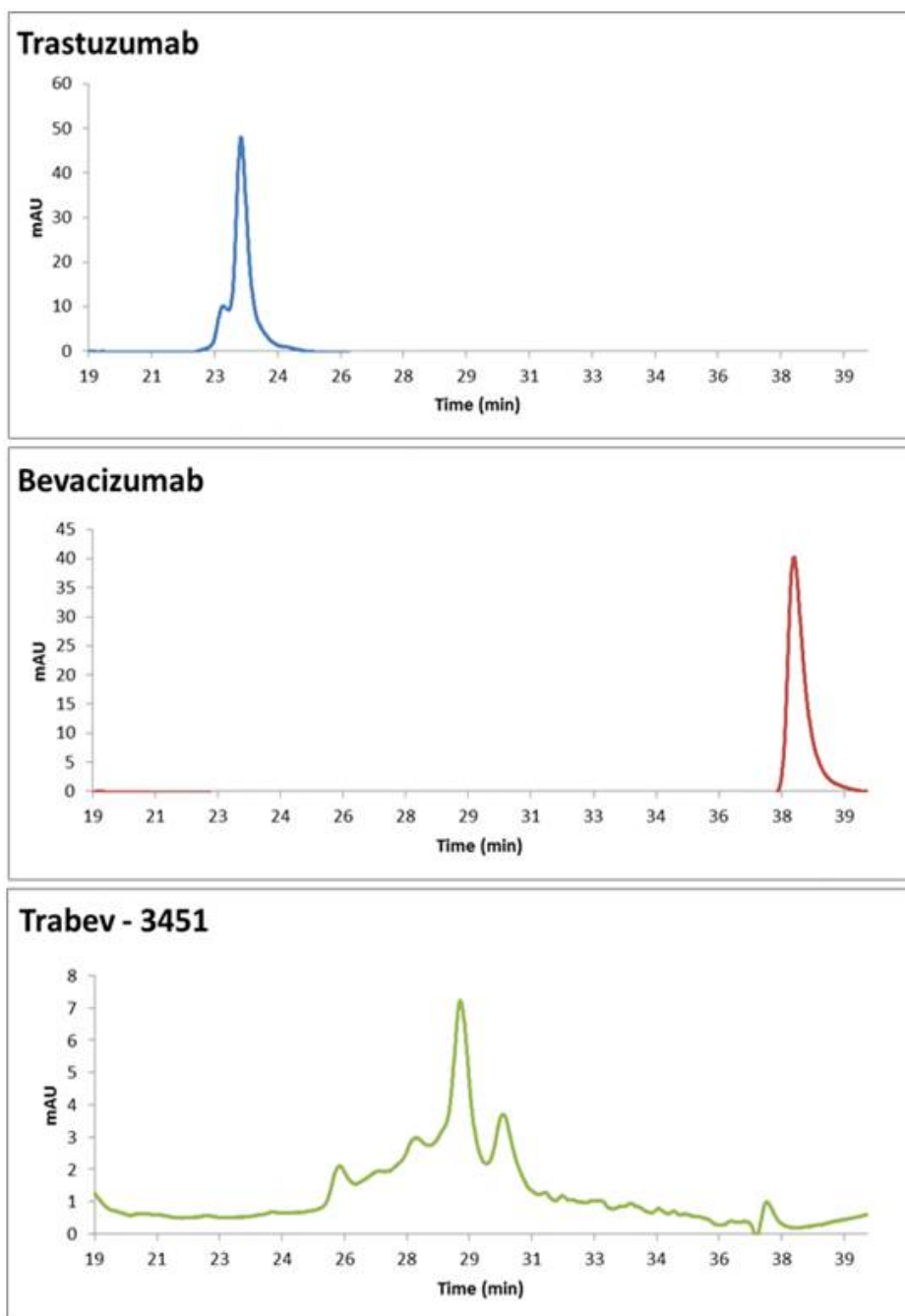


FIG. 36

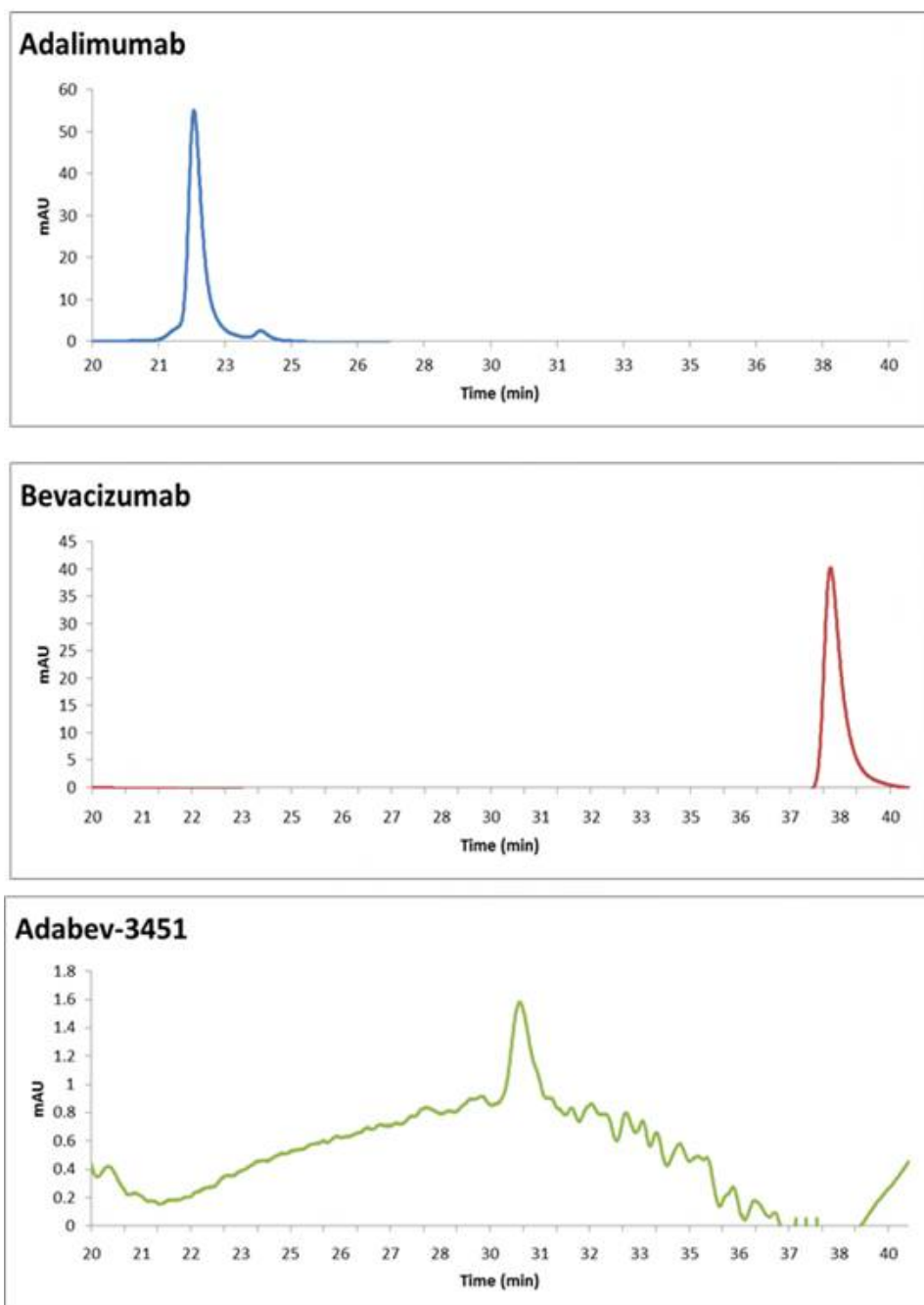


FIG. 37

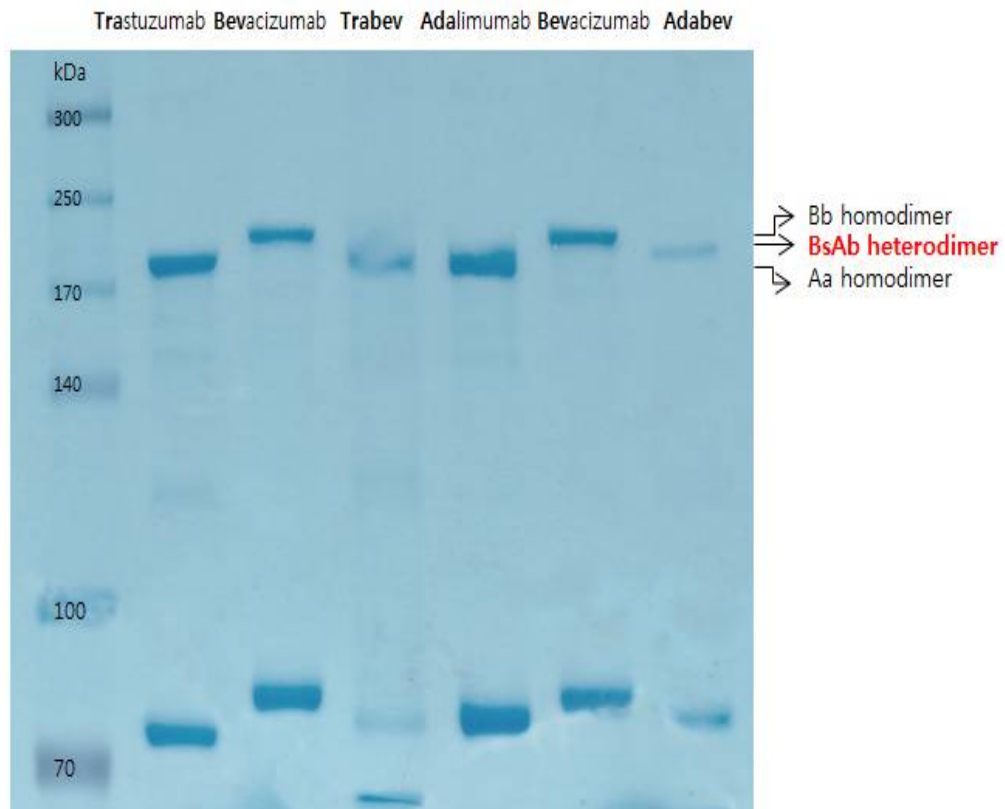


FIG. 38

c40Φf44



FIG. 39

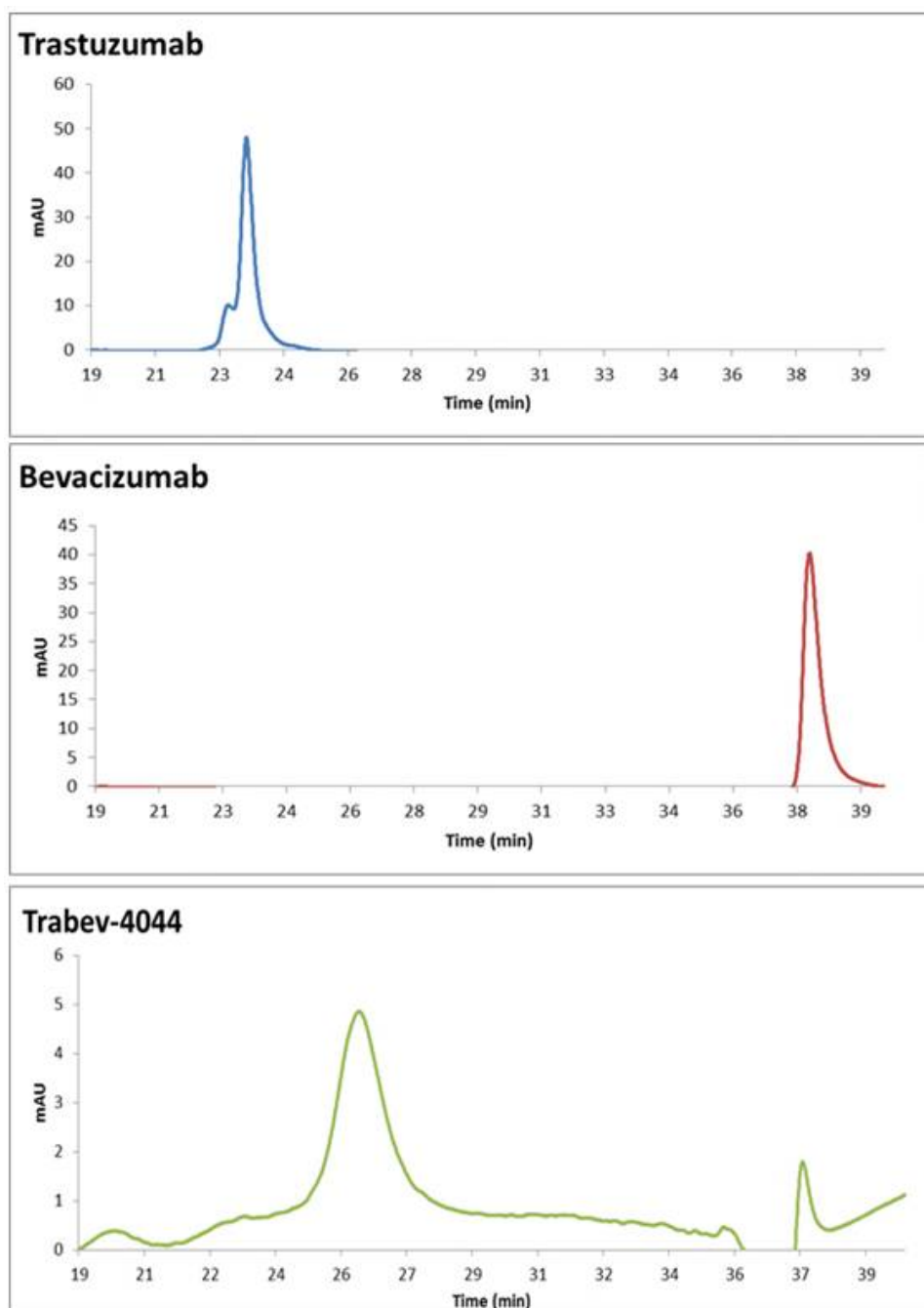


FIG. 40

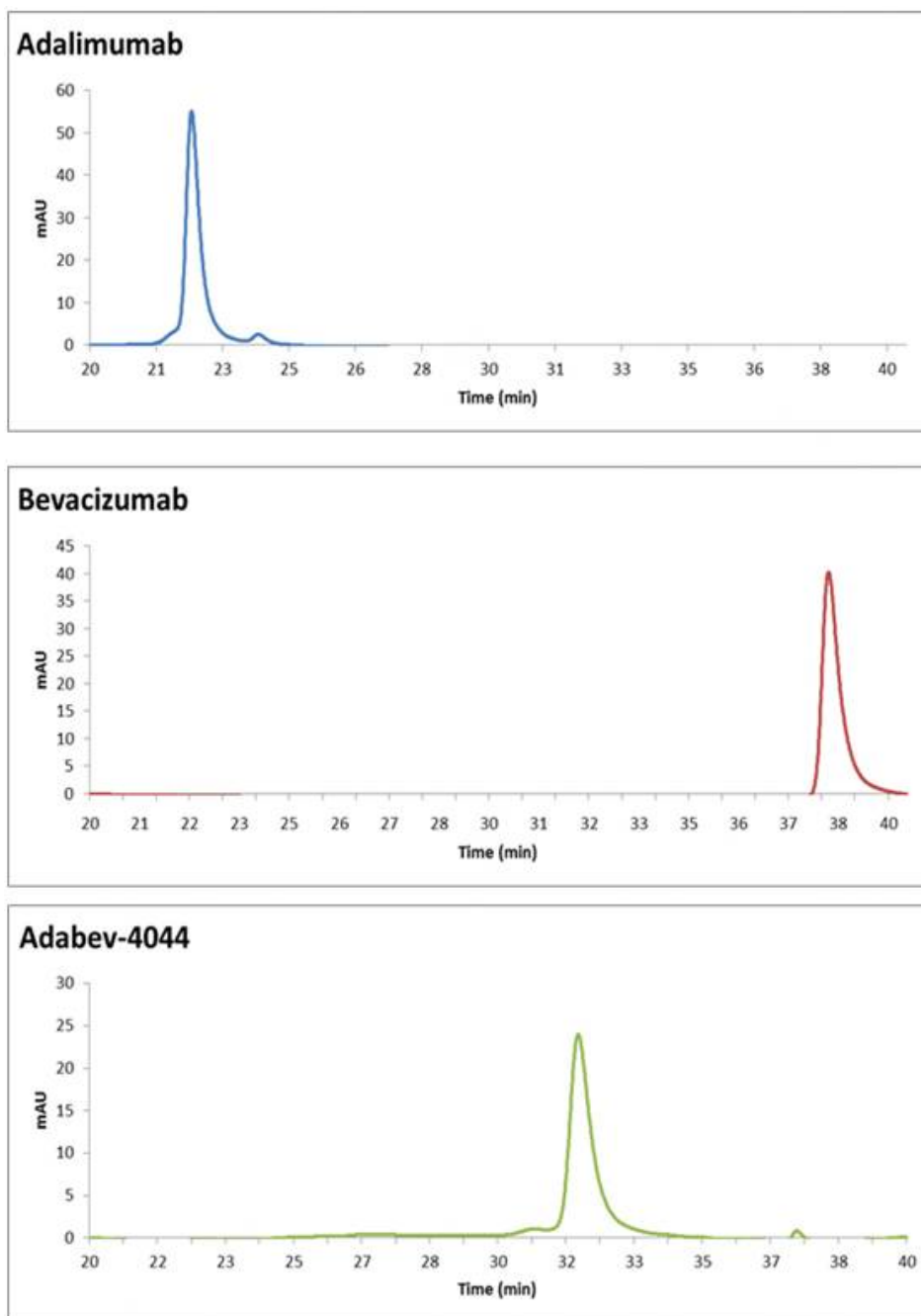


FIG. 41

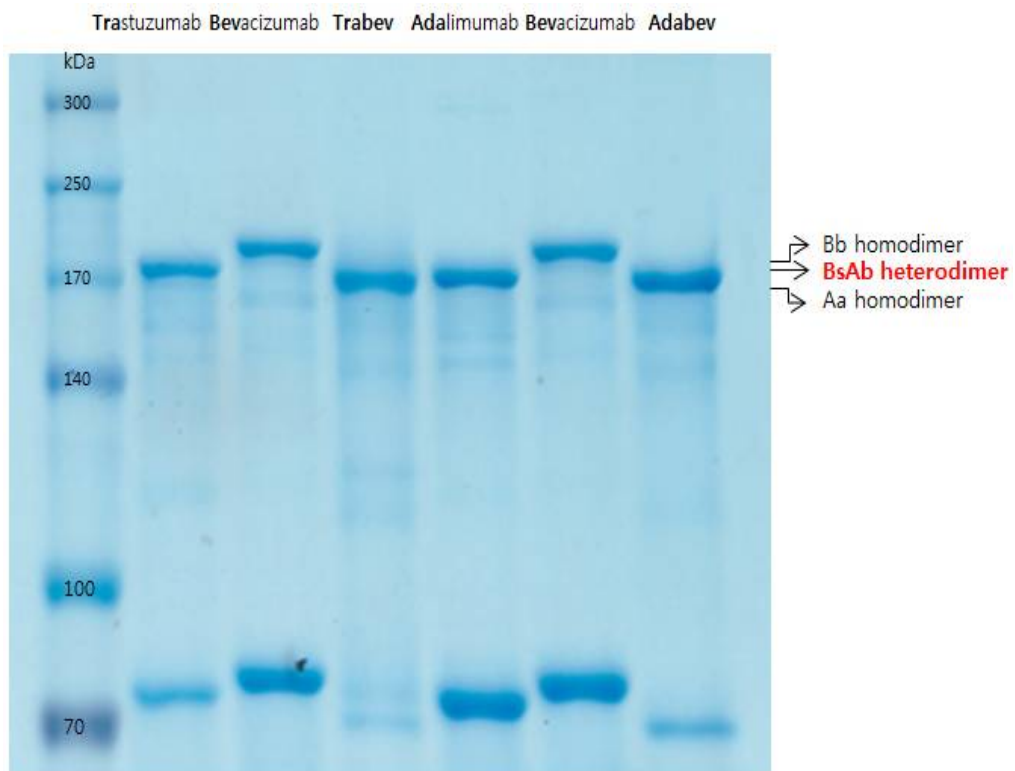


FIG. 42

