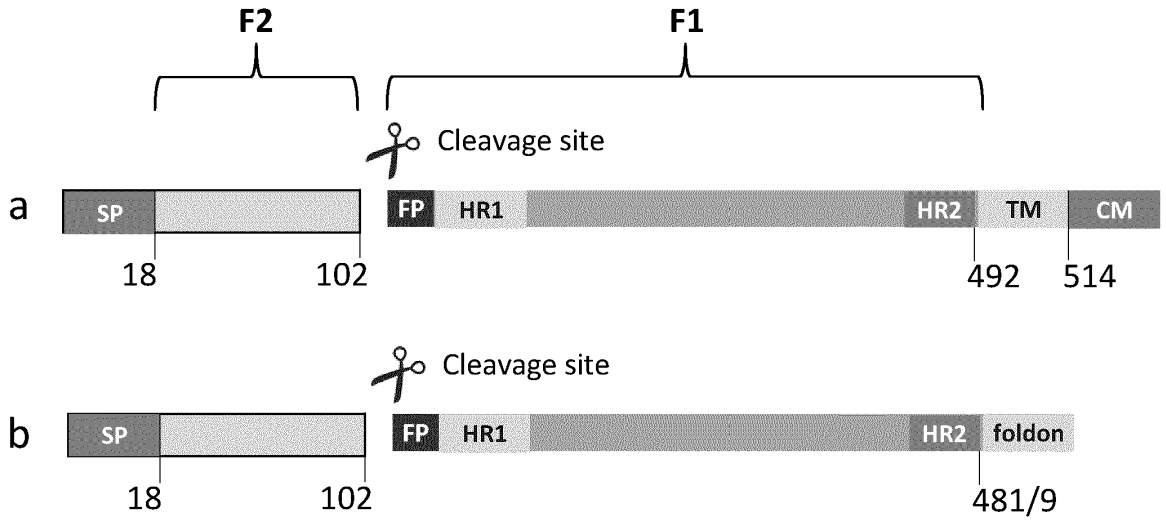

F2
F1
Cleavage site
a
SP
FP
HR1
HR2
TM
CM
18
102
492
514
Cleavage site
b
SP
FP
HR1
HR2
foldon
18
102
481/9

Fig. 1

A

MPV201285	*DQLARE*	*EQIENP$_{98}$RRRR$_{102}$*	**F$_{103}$V**
MPV210531	*DQLARE*	*EQIENP$_{98}$RRRR*	**F$_{103}$V**
MPV210502	*DQLA$_{90}$--*	*------RRRR*	**F$_{103}$V**
MPV210500	*DQLA$_{90}$RRRR*	*-I$_{95}$ENP$_{98}$RRRR*	**F$_{103}$V**
MPV210507	*DQ$_{88}$RRRR*	*E$_{93}$QIENP$_{98}$RRRR*	**F$_{103}$V**
MPV210509	*DQLA$_{90}$RRRR*	*E$_{92}$EQIENPRRRR*	**F$_{103}$V**

F2 domain F1 domain

B

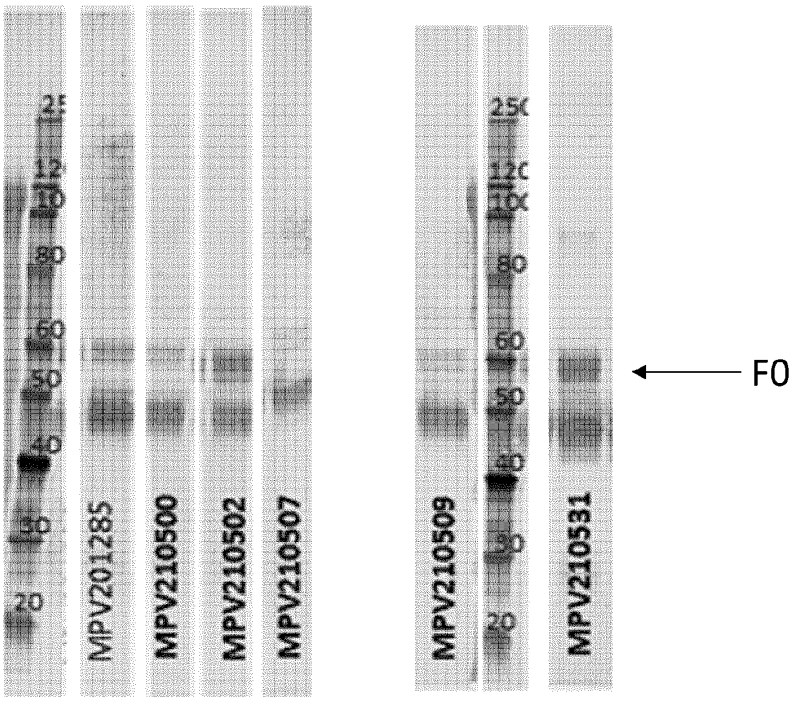


Fig. 2

C

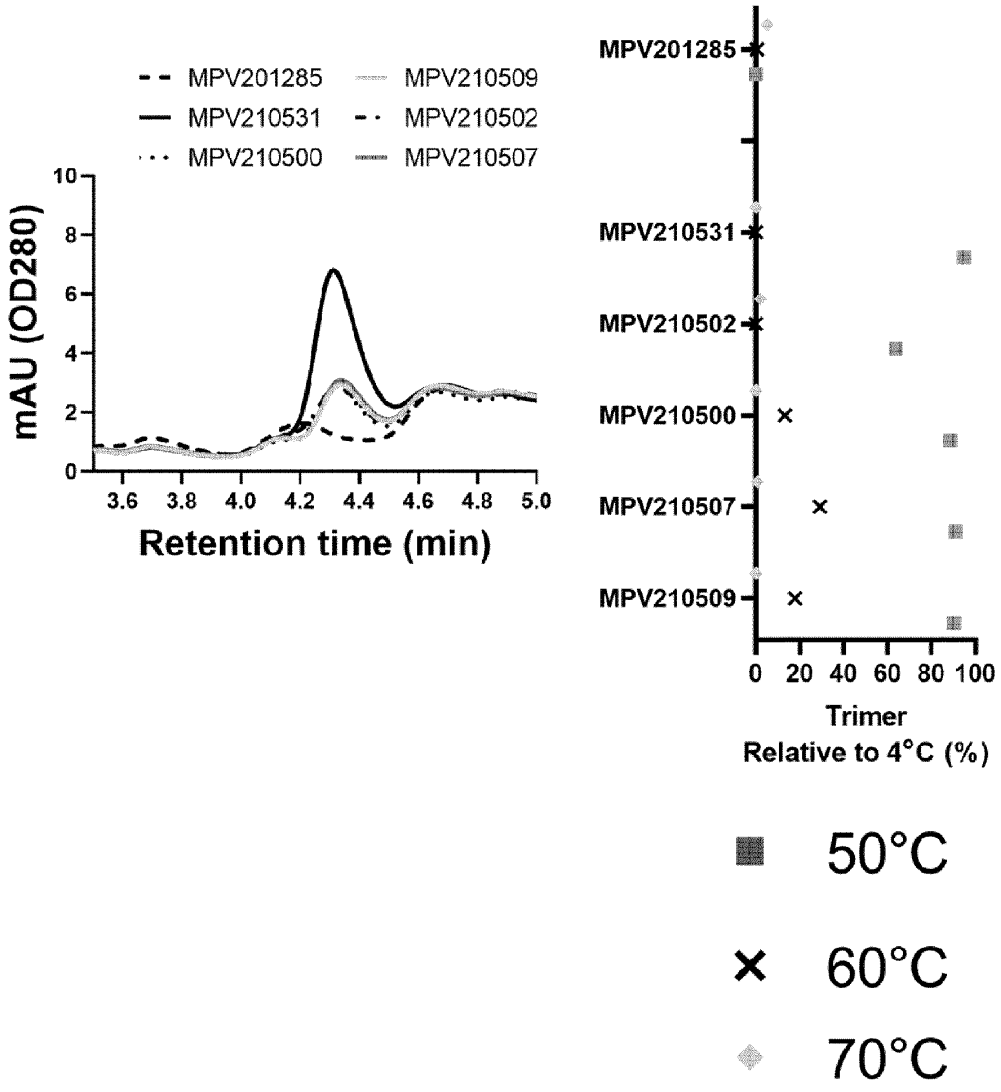


Fig. 2 continued

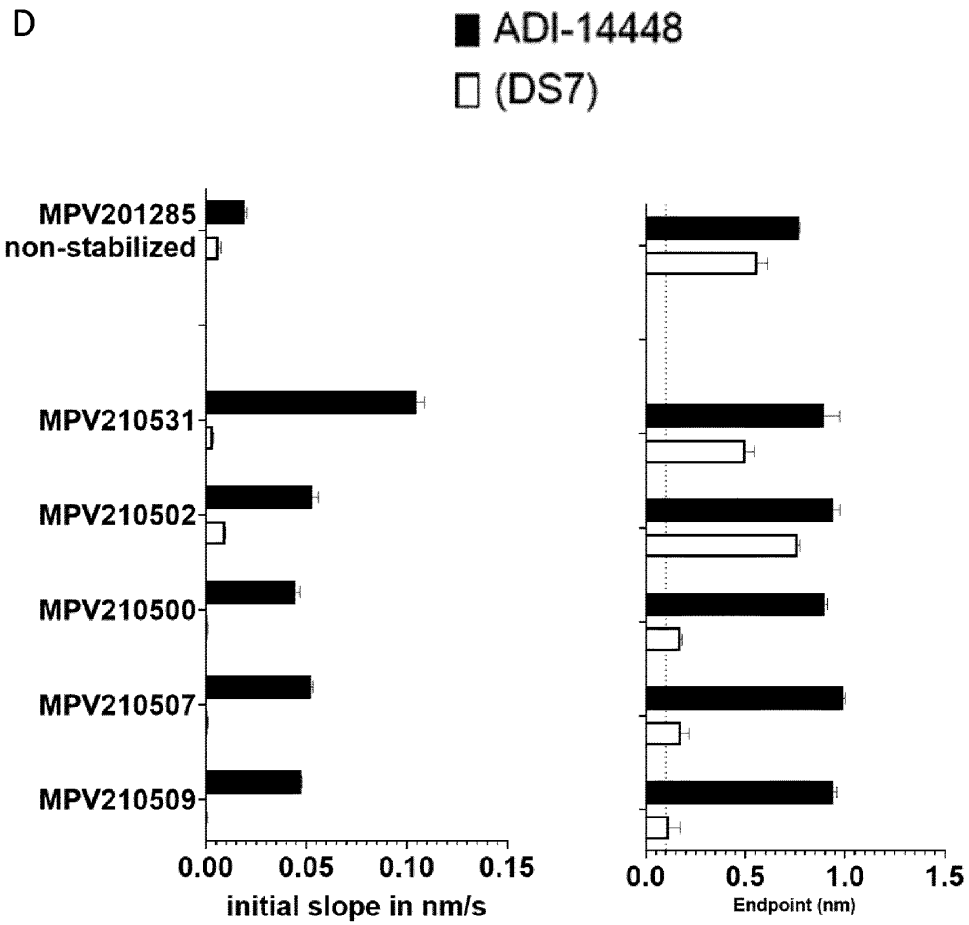


Fig. 2 continued

A

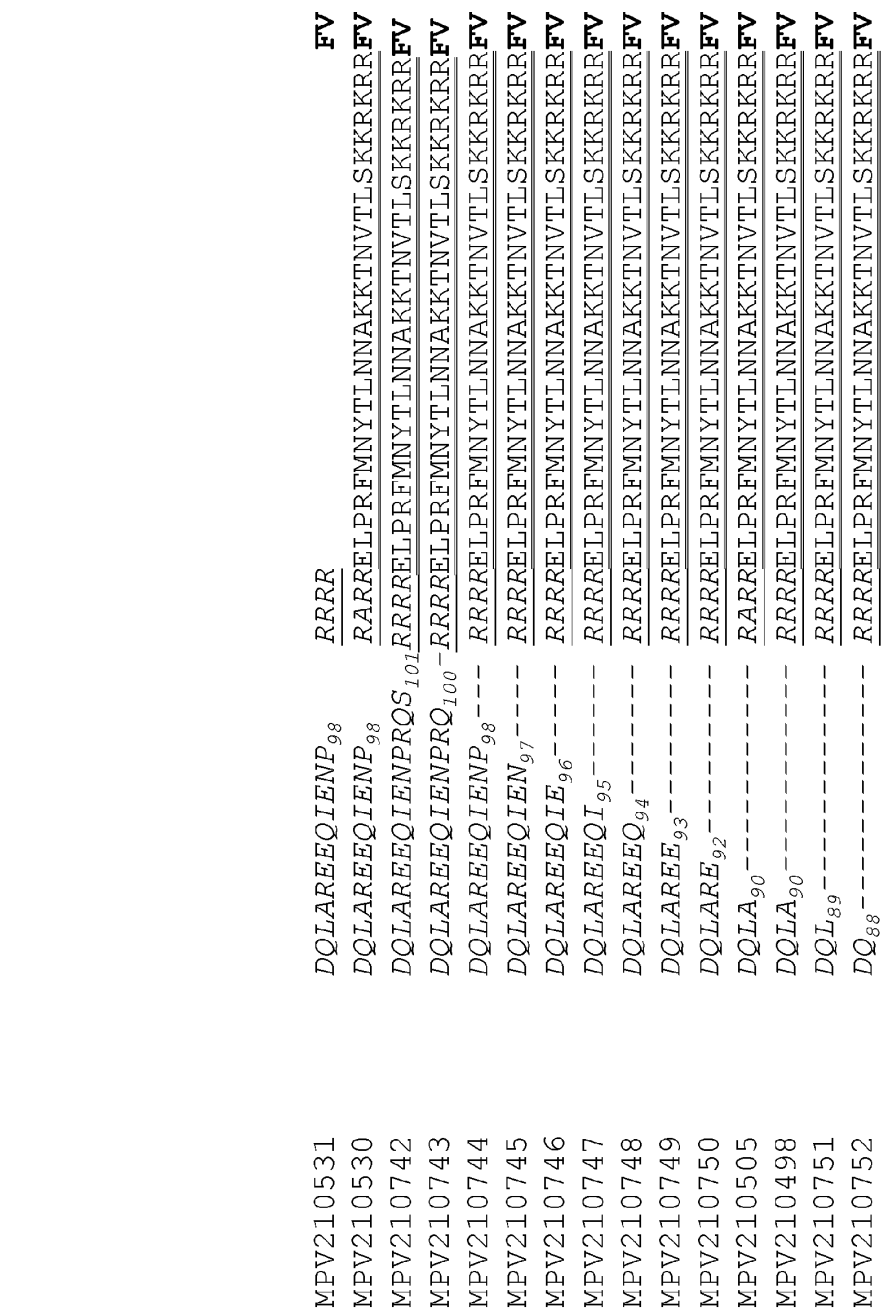
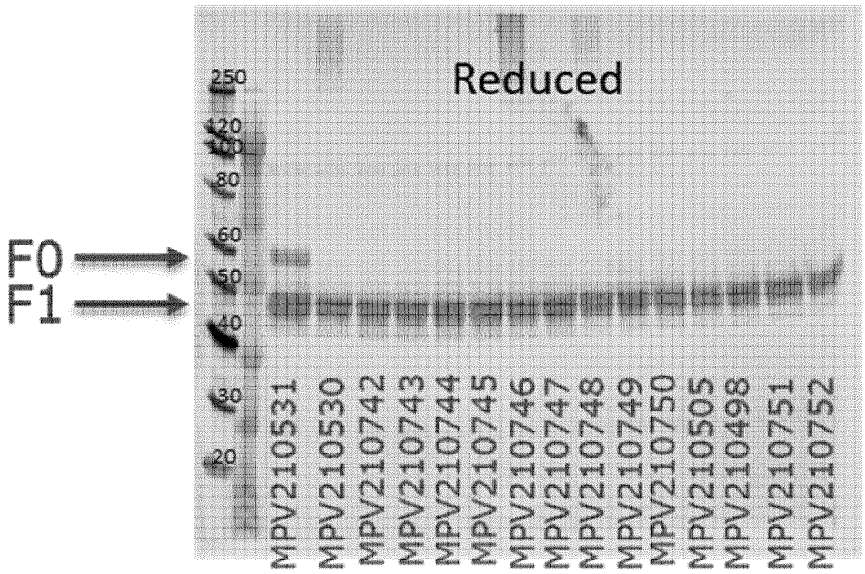

MPV210531 DQLAREEQIENP98 RRRR FV
MPV210530 DQLAREEQIENP98 RARRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210742 DQLAREEQIENPRQS101RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210743 DQLAREEQIENPRQ100-RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210744 DQLAREEQIENP98--- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210745 DQLAREEQIEN97---- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210746 DQLAREEQIE96----- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210747 DQLAREEQI95------ RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210748 DQLAREEQ94------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210749 DQLAREE93-------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210750 DQLARE92--------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210505 DQLA90---------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210498 DQLA90---------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210751 DQL89----------- RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV
MPV210752 DQ88------------ RRRRELPRFMNYTLNNAKKTNVTLSKKRKRRFV

Fig. 3

B



C

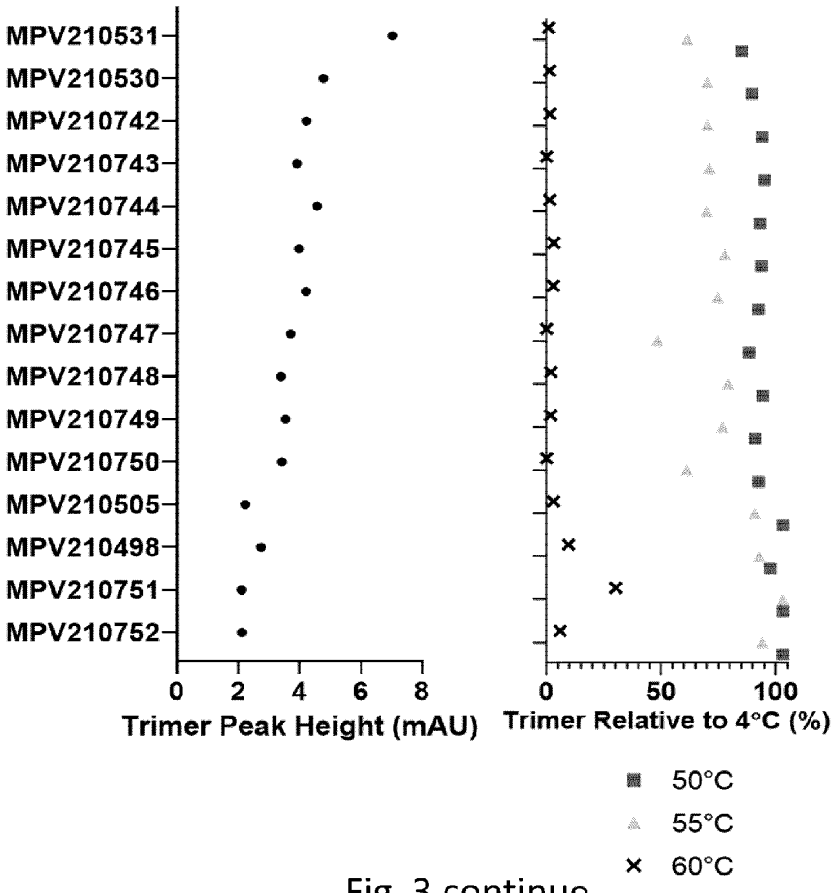


Fig. 3 continue

D

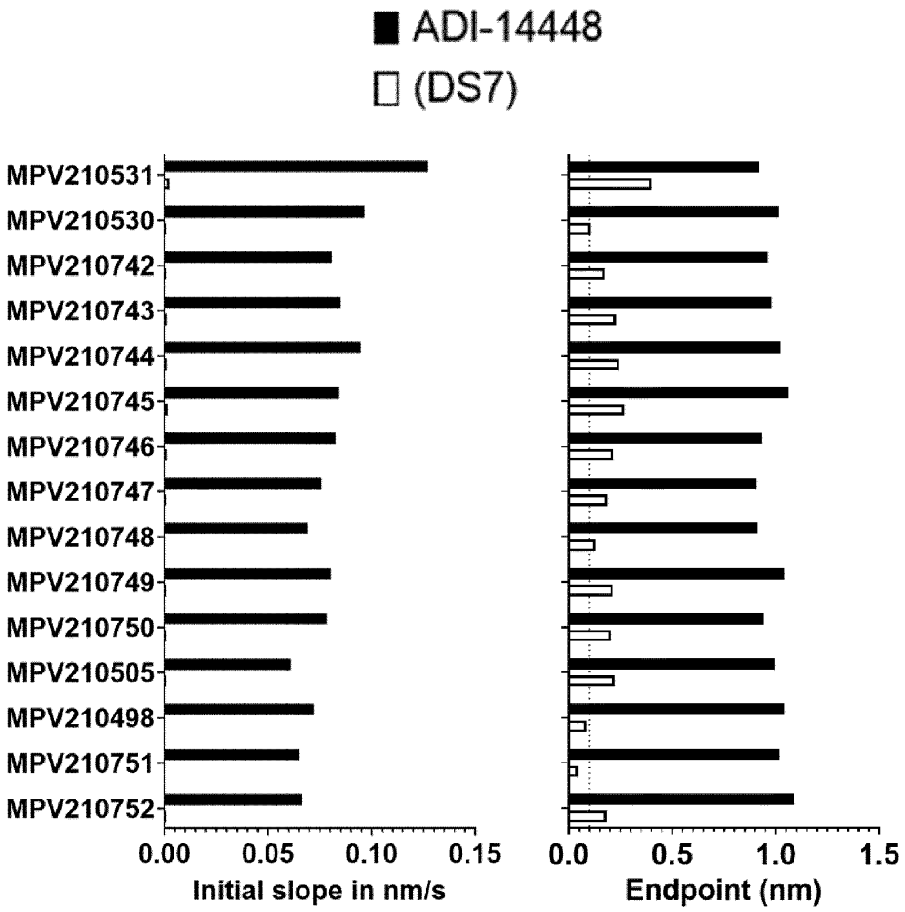
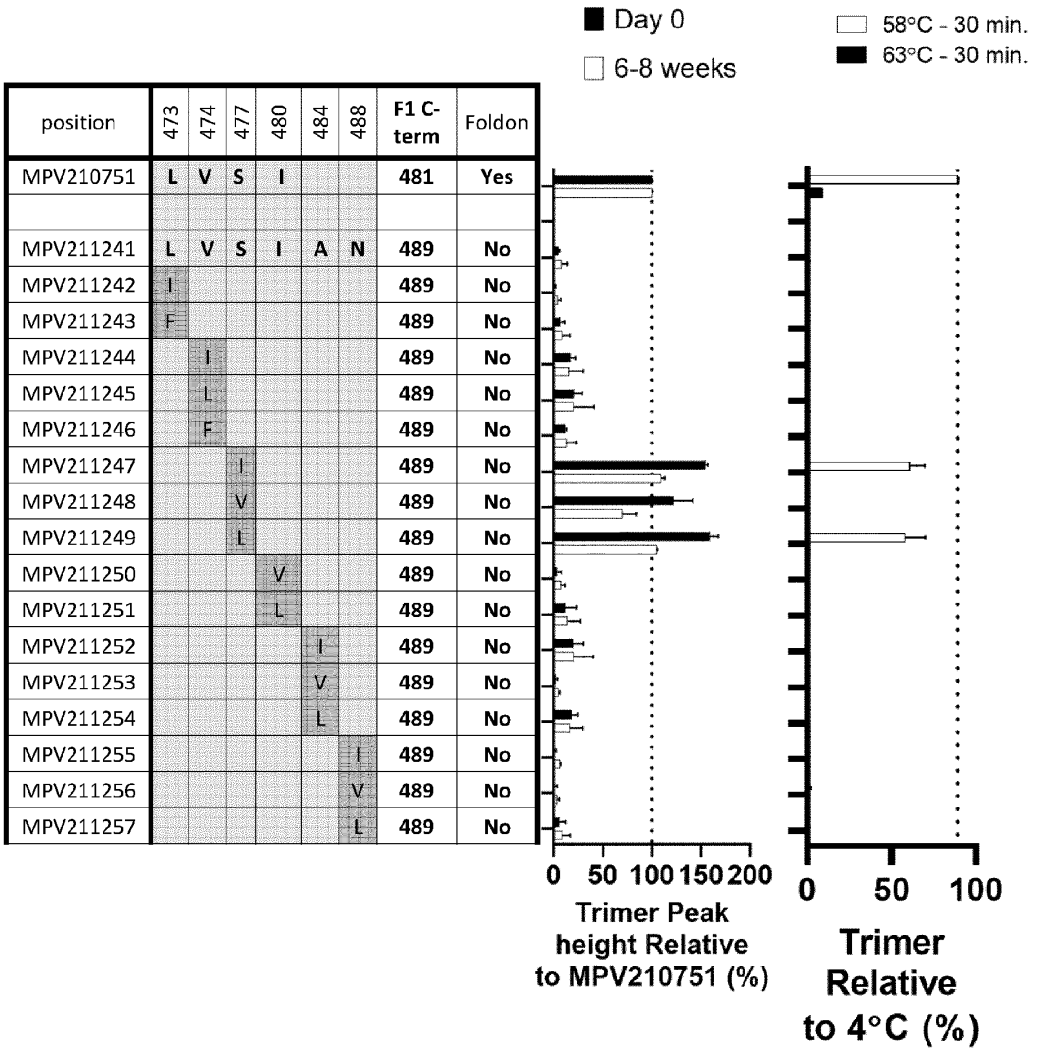
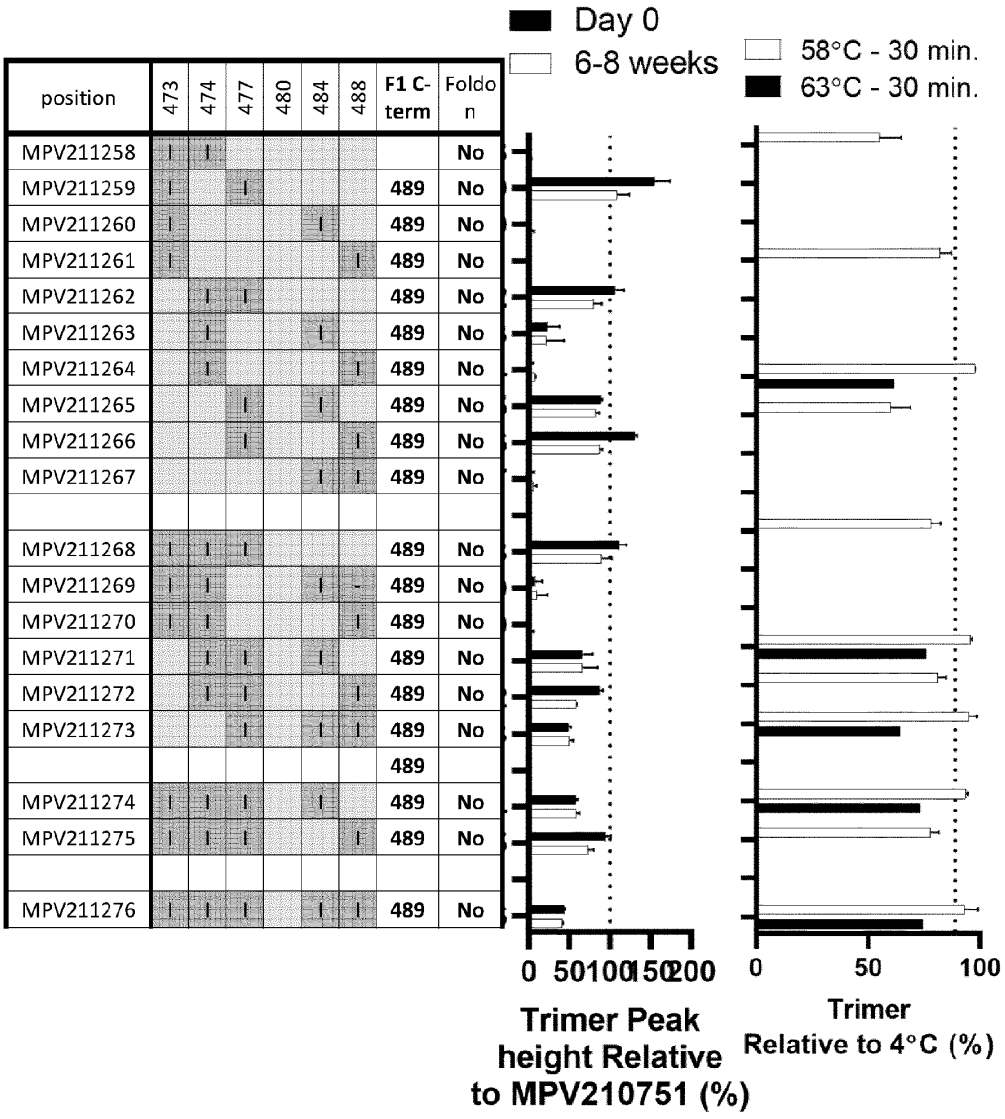


Fig. 3 continued



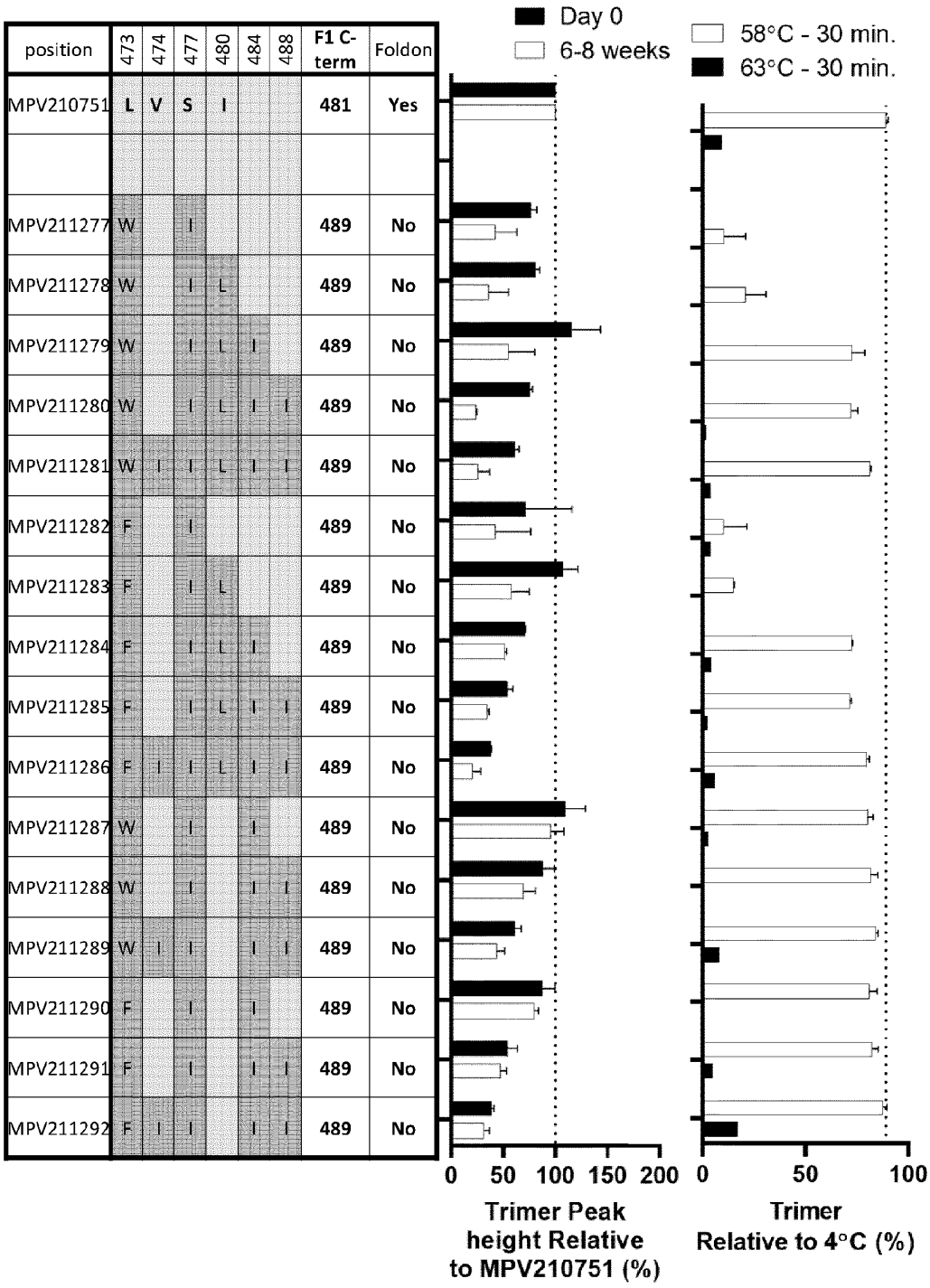
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MPV210751	L	V	S	I			481	Yes
MPV211241	L	V	S	I	A	N	489	No
MPV211242	I						489	No
MPV211243	F						489	No
MPV211244		I					489	No
MPV211245		L					489	No
MPV211246		F					489	No
MPV211247			I				489	No
MPV211248			V				489	No
MPV211249			L				489	No
MPV211250				V			489	No
MPV211251				L			489	No
MPV211252					I		489	No
MPV211253					V		489	No
MPV211254					L		489	No
MPV211255						I	489	No
MPV211256						V	489	No
MPV211257						L	489	No

Fig. 4



position	473	474	477	480	484	488	F1 C-term	Foldon
MPV211258	I	I						No
MPV211259	I		I				489	No
MPV211260	I				I		489	No
MPV211261	I					I	489	No
MPV211262		I	I				489	No
MPV211263		I			I		489	No
MPV211264		I				I	489	No
MPV211265			I		I		489	No
MPV211266			I			I	489	No
MPV211267					I	I	489	No
MPV211268	I	I	I				489	No
MPV211269	I	I			I	-	489	No
MPV211270	I	I				I	489	No
MPV211271		I	I		I		489	No
MPV211272		I	I			I	489	No
MPV211273			I		I	I	489	No
							489	
MPV211274	I	I	I		I		489	No
MPV211275	I	I	I			I	489	No
MPV211276	I	I	I		I	I	489	No

Fig. 4 continued

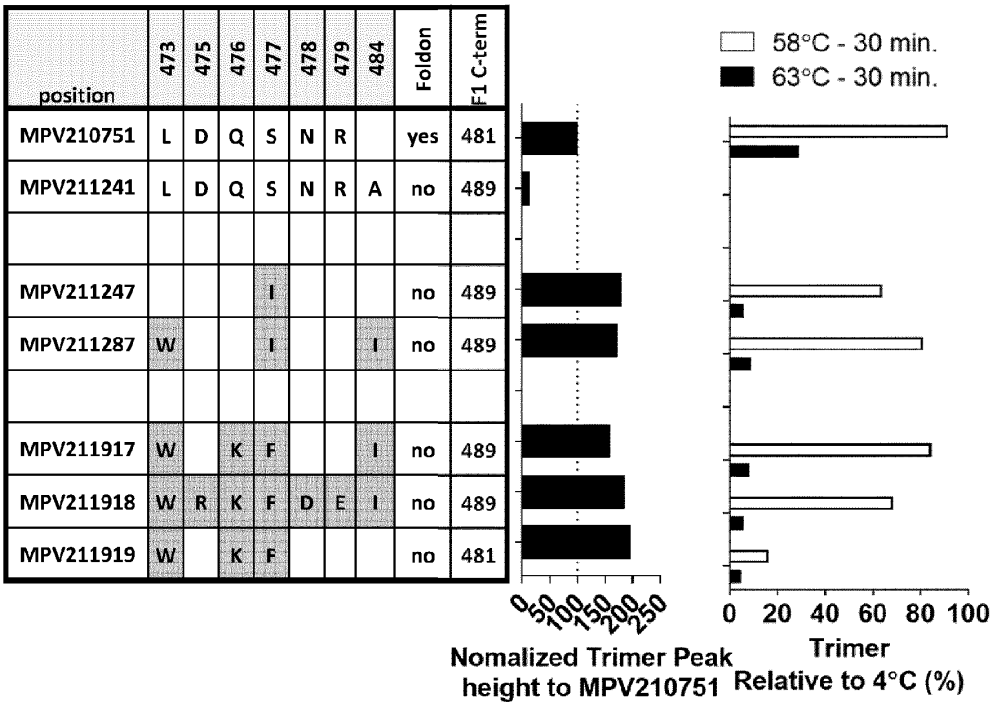


position	473	474	477	480	484	488	F1 C-term	Foldon
MPV210751	L	V	S	I			481	Yes
MPV211277	W		I				489	No
MPV211278	W		I	L			489	No
MPV211279	W		I	L	I		489	No
MPV211280	W		I	L	I	I	489	No
MPV211281	W	I	I	L	I	I	489	No
MPV211282	F		I				489	No
MPV211283	F		I	L			489	No
MPV211284	F		I	L	I		489	No
MPV211285	F		I	L	I	I	489	No
MPV211286	F	I	I	L	I	I	489	No
MPV211287	W		I		I		489	No
MPV211288	W		I		I	I	489	No
MPV211289	W	I	I		I	I	489	No
MPV211290	F		I		I		489	No
MPV211291	F		I		I	I	489	No
MPV211292	F	I	I		I	I	489	No

Fig. 4 continued

A

position	473	475	476	477	478	479	484	Foldon	F1 C-term
MPV210751	L	D	Q	S	N	R		yes	481
MPV211241	L	D	Q	S	N	R	A	no	489
MPV211247				I				no	489
MPV211287	W			I			I	no	489
MPV211917	W		K	F			I	no	489
MPV211918	W	R	K	F	D	E	I	no	489
MPV211919	W		K	F				no	481



B

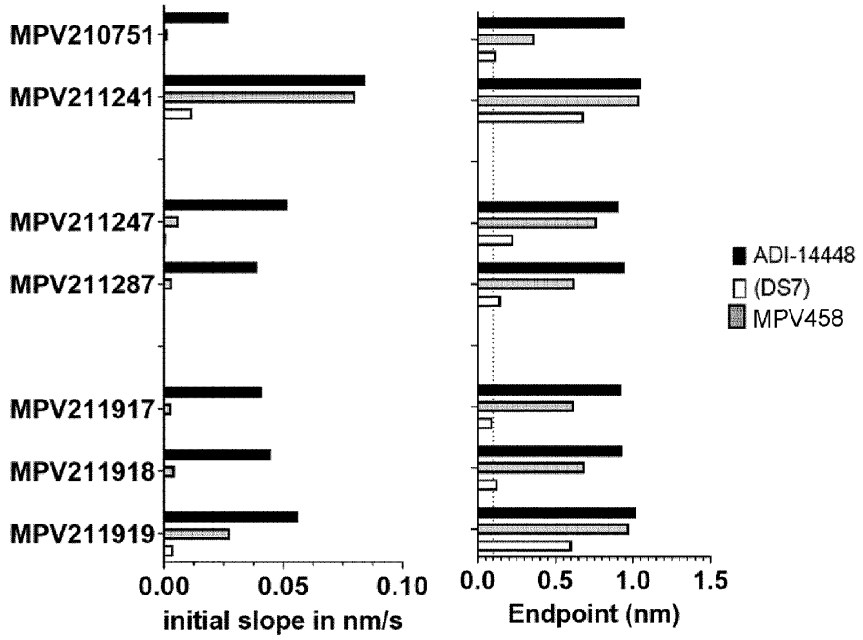
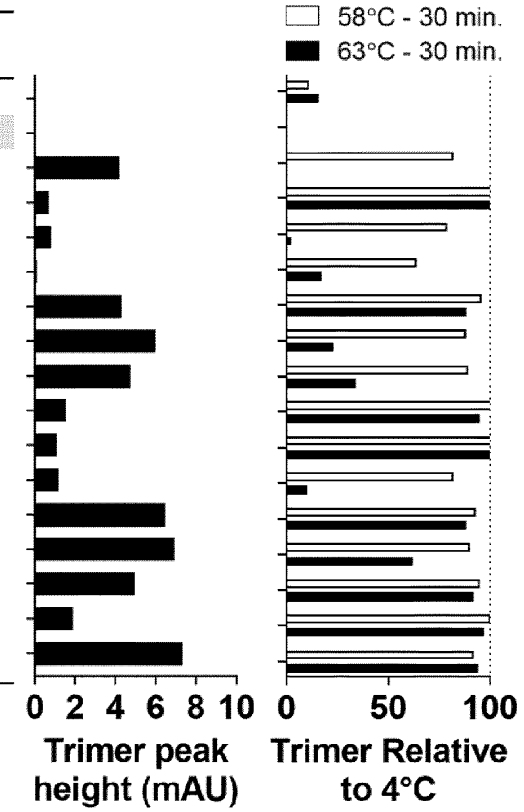


Fig. 5

A

	V112	D209	V231	E453
MPV211940	-	-	-	Q
MPV212018	R	-	-	Q
MPV212019	-	E	-	Q
MPV212020	-	-	I	Q
MPV212021	-	-	-	P
MPV212022	R	E	-	Q
MPV212023	R	-	I	Q
MPV212024	R	-	-	P
MPV212025	-	E	I	Q
MPV212026	-	E	-	P
MPV212027	-	-	I	P
MPV212028	R	E	I	Q
MPV212029	R	-	I	P
MPV212030	R	E	-	P
MPV212031	-	E	I	P
MPV212032	R	E	I	P



B

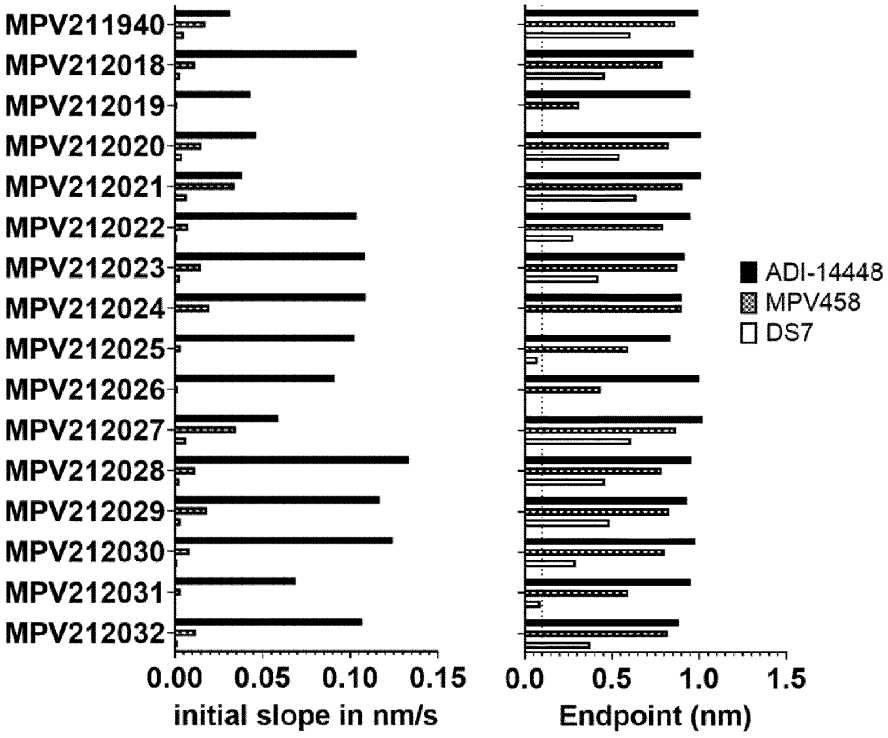
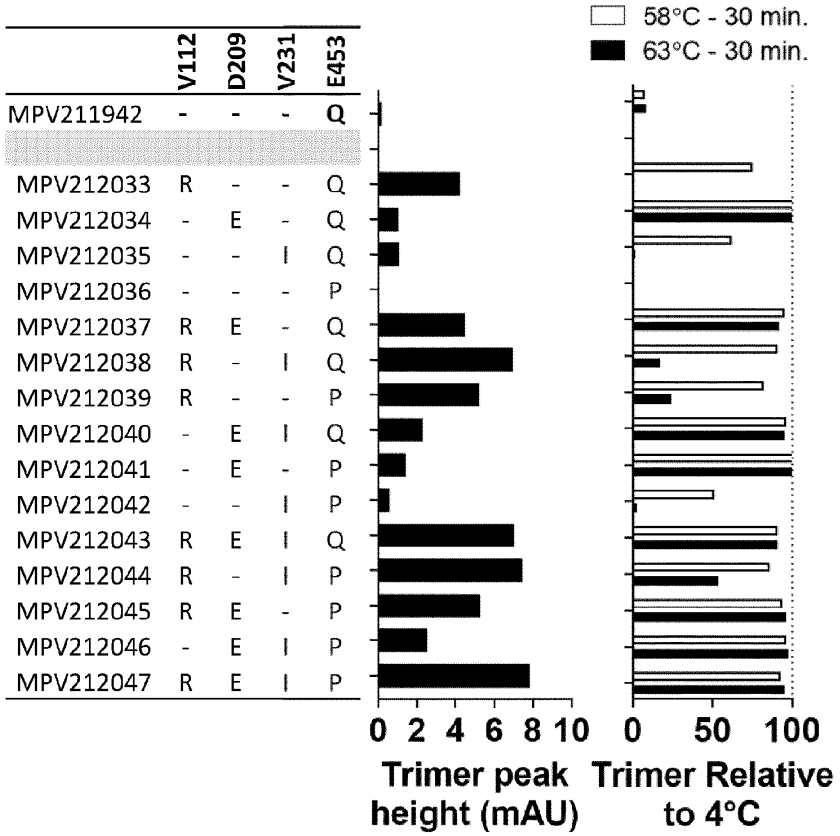


Fig .6

A

	V112	D209	V231	E453
MPV211942	-	-	-	Q
MPV212033	R	-	-	Q
MPV212034	-	E	-	Q
MPV212035	-	-	I	Q
MPV212036	-	-	-	P
MPV212037	R	E	-	Q
MPV212038	R	-	I	Q
MPV212039	R	-	-	P
MPV212040	-	E	I	Q
MPV212041	-	E	-	P
MPV212042	-	-	I	P
MPV212043	R	E	I	Q
MPV212044	R	-	I	P
MPV212045	R	E	-	P
MPV212046	-	E	I	P
MPV212047	R	E	I	P



B

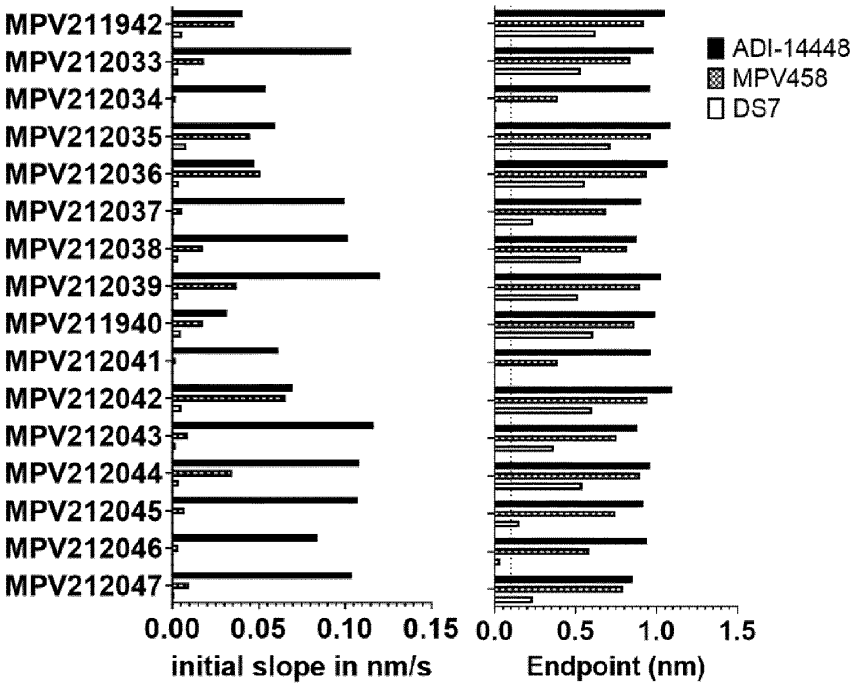


Fig. 7

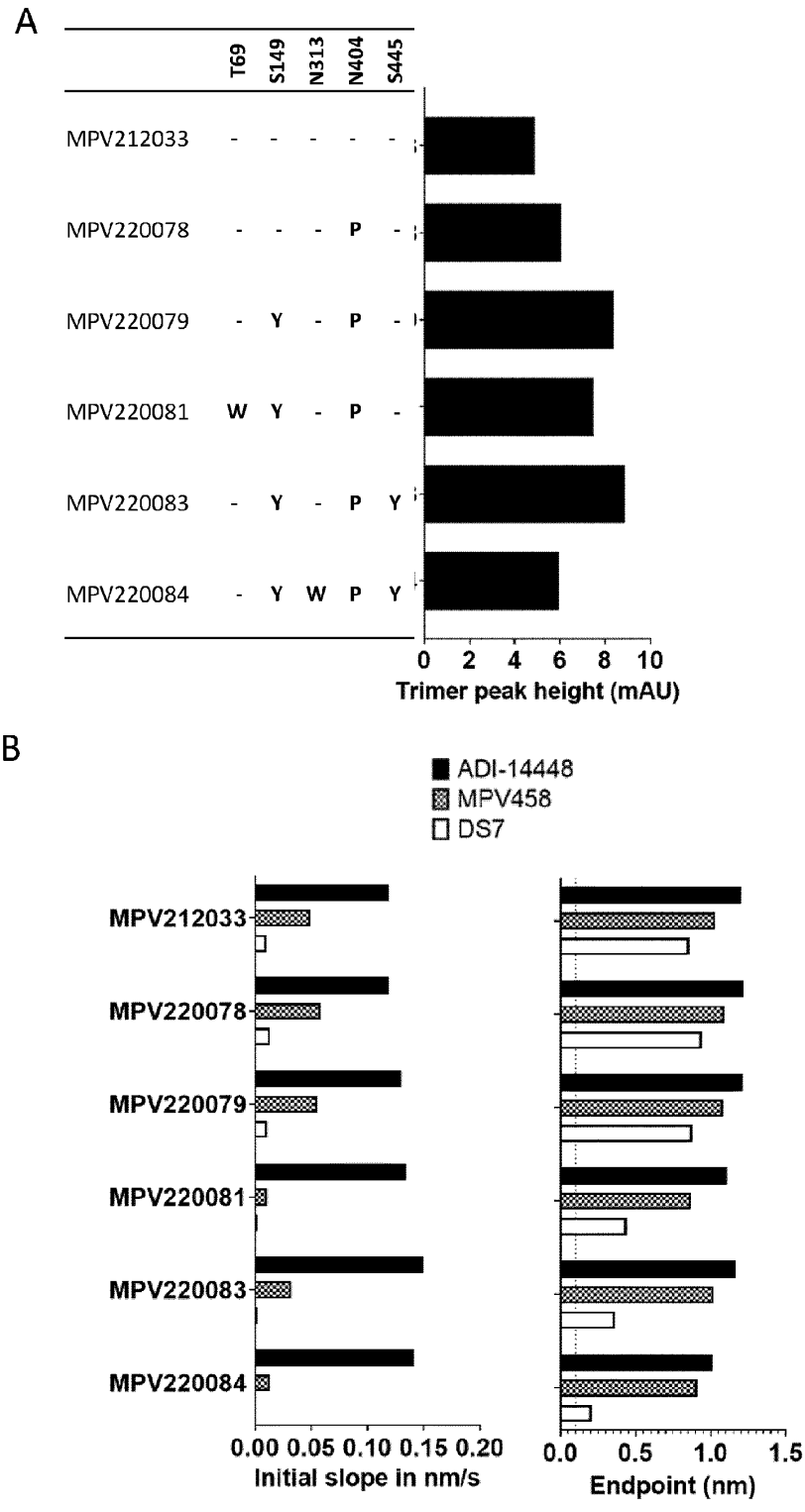

A
T69
S149
N313
N404
S445
MPV212033 - - - - -
MPV220078 - - - P -
MPV220079 - Y - P -
MPV220081 W Y - P -
MPV220083 - Y - P Y
MPV220084 - Y W P Y
0 2 4 6 8 10
Trimer peak height (mAU)
B
ADI-14448
MPV458
DS7
MPV212033
MPV220078
MPV220079
MPV220081
MPV220083
MPV220084
0.00 0.05 0.10 0.15 0.20
Initial slope in nm/s
0.0 0.5 1.0 1.5
Endpoint (nm)

Fig 8

C

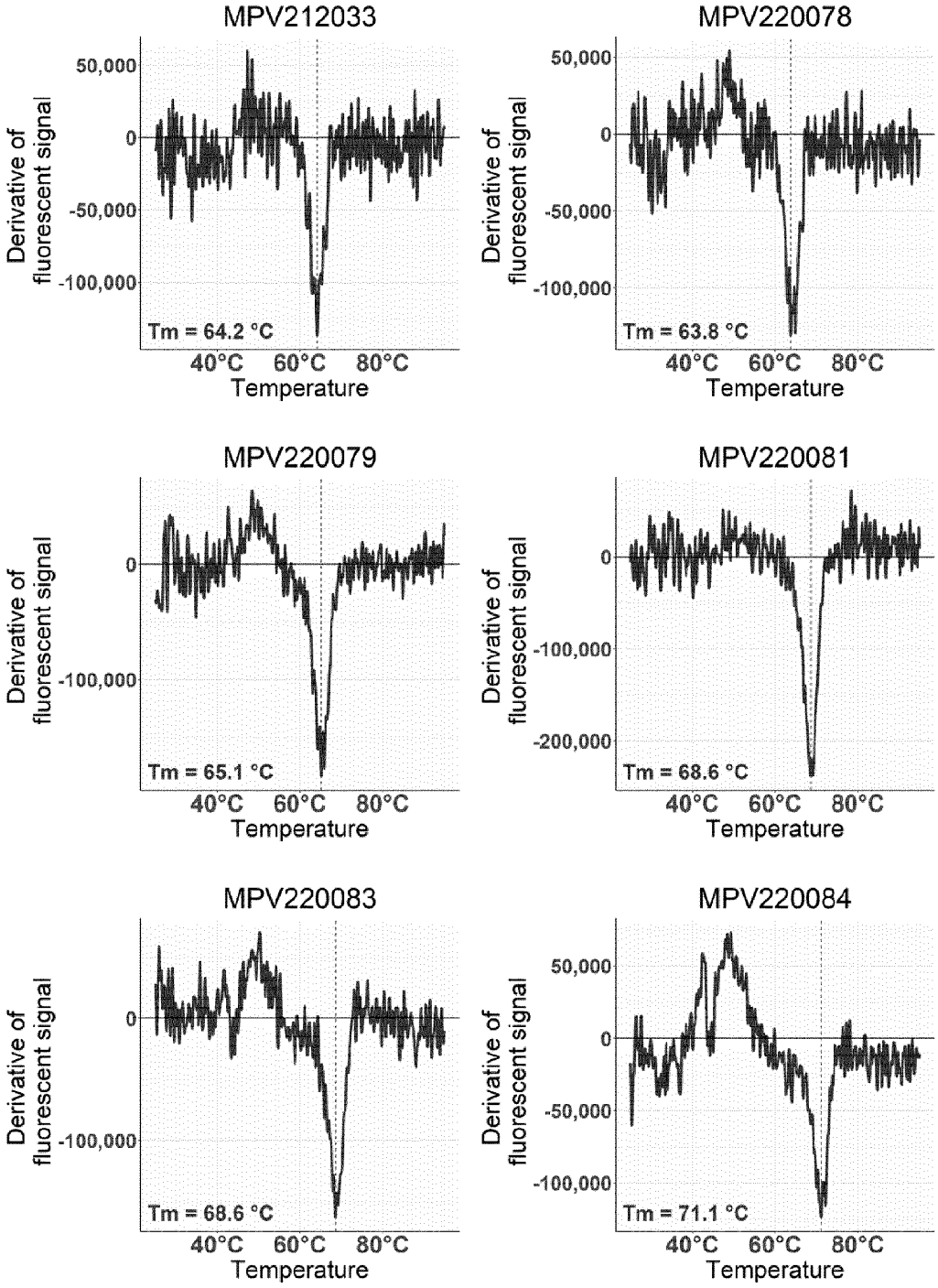
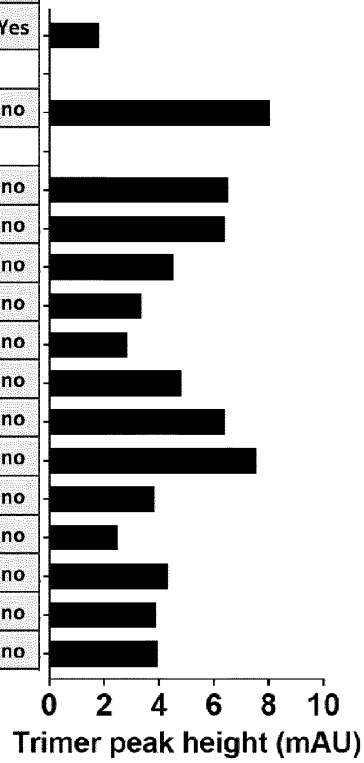


Fig. 8 - continued

A

	473	474	477	484	485	F1 C-term	Foldon
	L	V	S	A	N		
MPV210751						481	Yes
MPV212047			*			489	no
MPV212032	W		I	I		489	no
MPV220115			I			489	no
MPV220116			I	I		489	no
MPV220117		I	I	I		489	no
MPV220118			I	I	I	489	no
MPV220119	I		I	I		489	no
MPV220120	Y		I	I		489	no
MPV220121	I	I		I		489	no
MPV220122	I	I	I	I		489	no
MPV220123	I	I	I	I	I	489	no
MPV220124			L	I		489	no
MPV220125			I	L		489	no
MPV220126			L	L		489	no

*L473W, D475R, Q476K, S477F, N478D, R479E, A484I



B

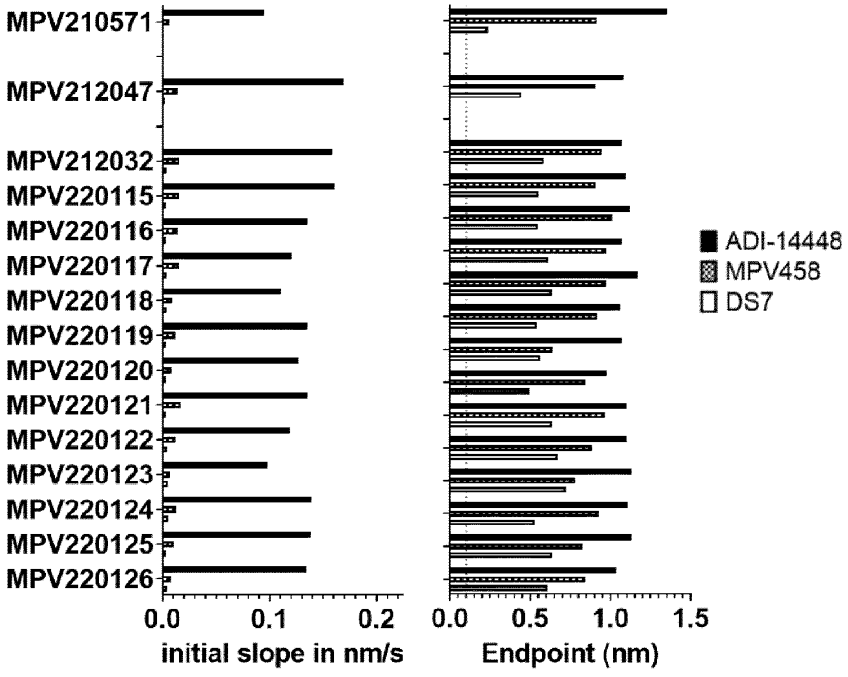


Fig. 9

C

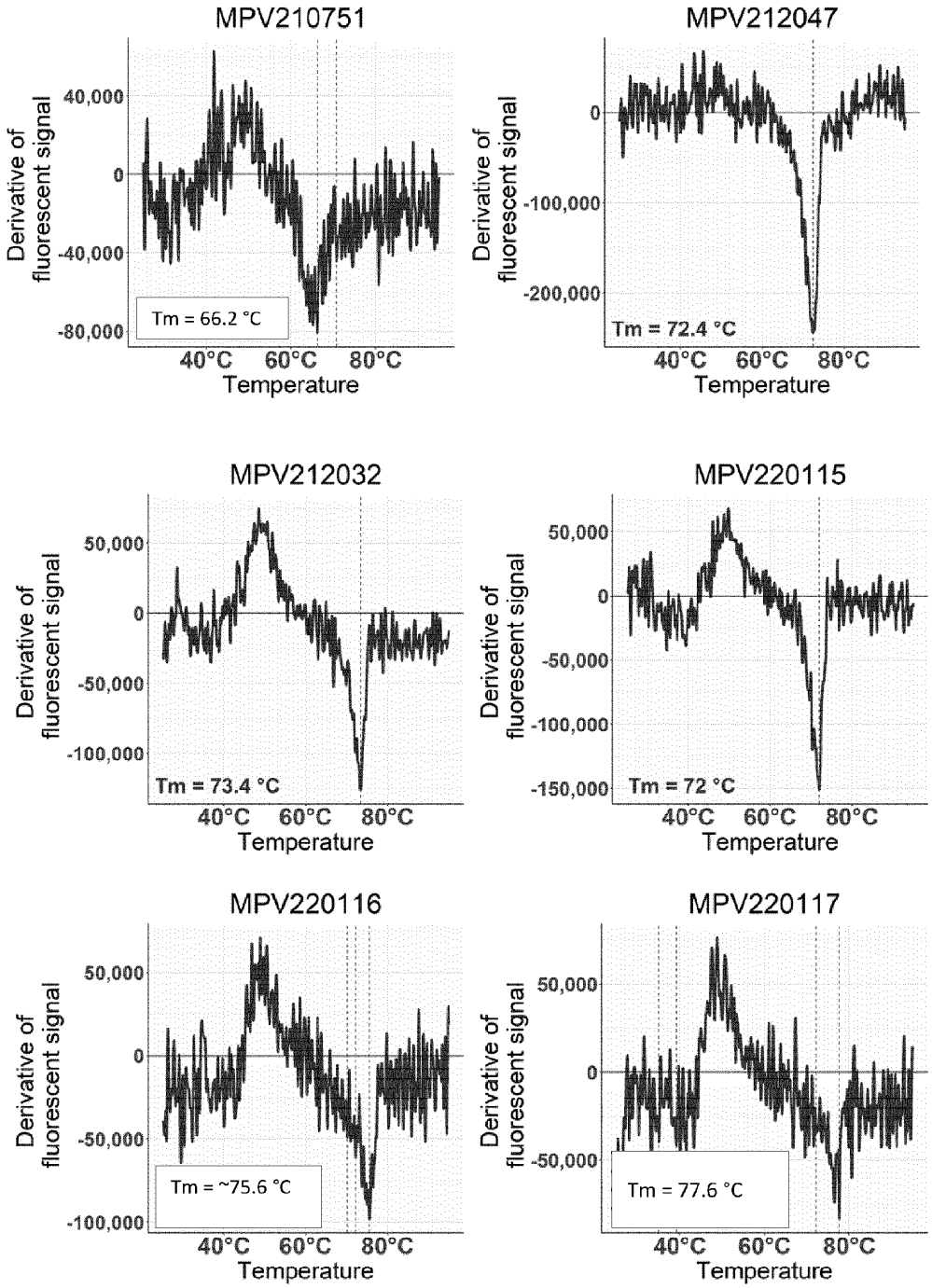


Fig. 9 continued

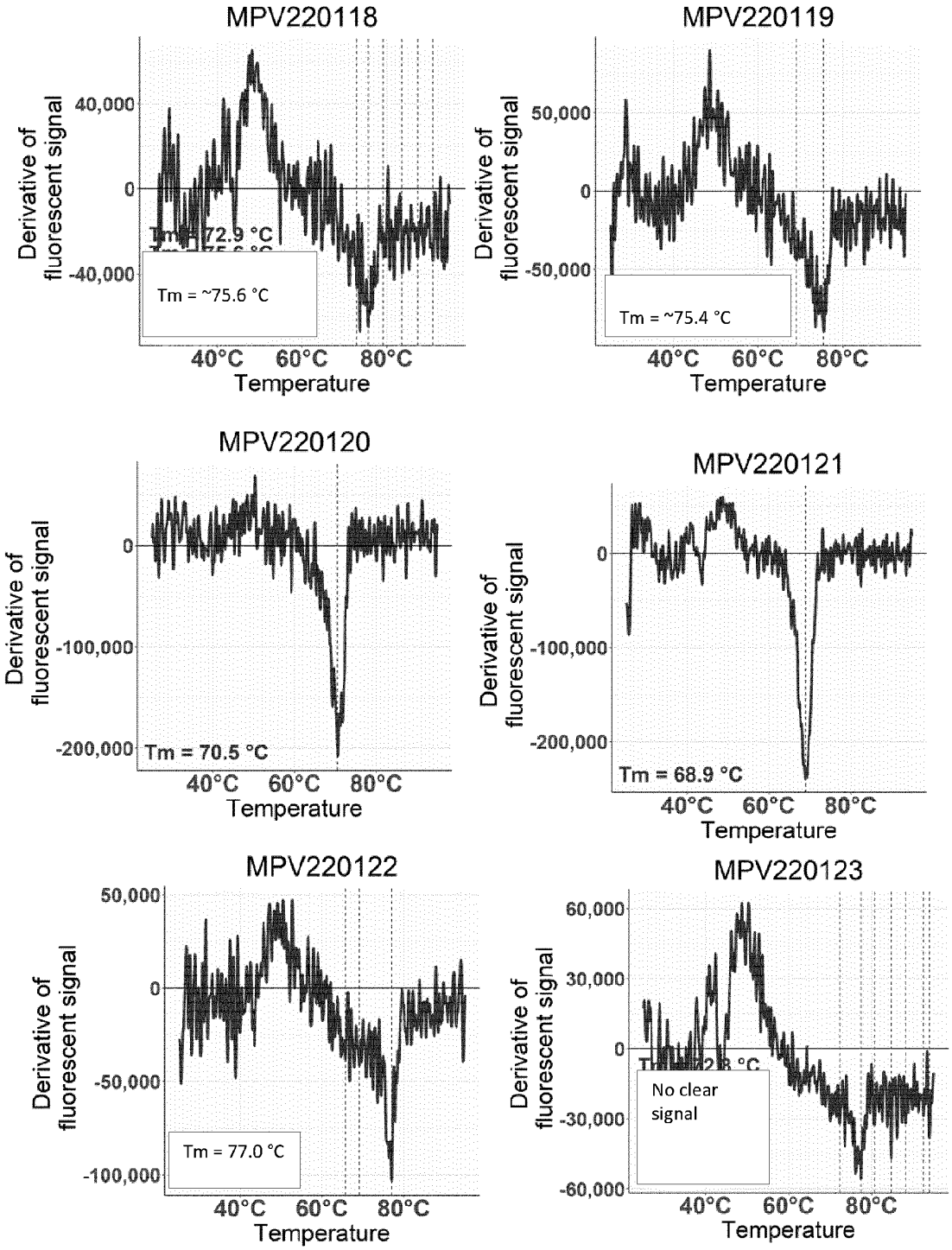


Fig.9 continued

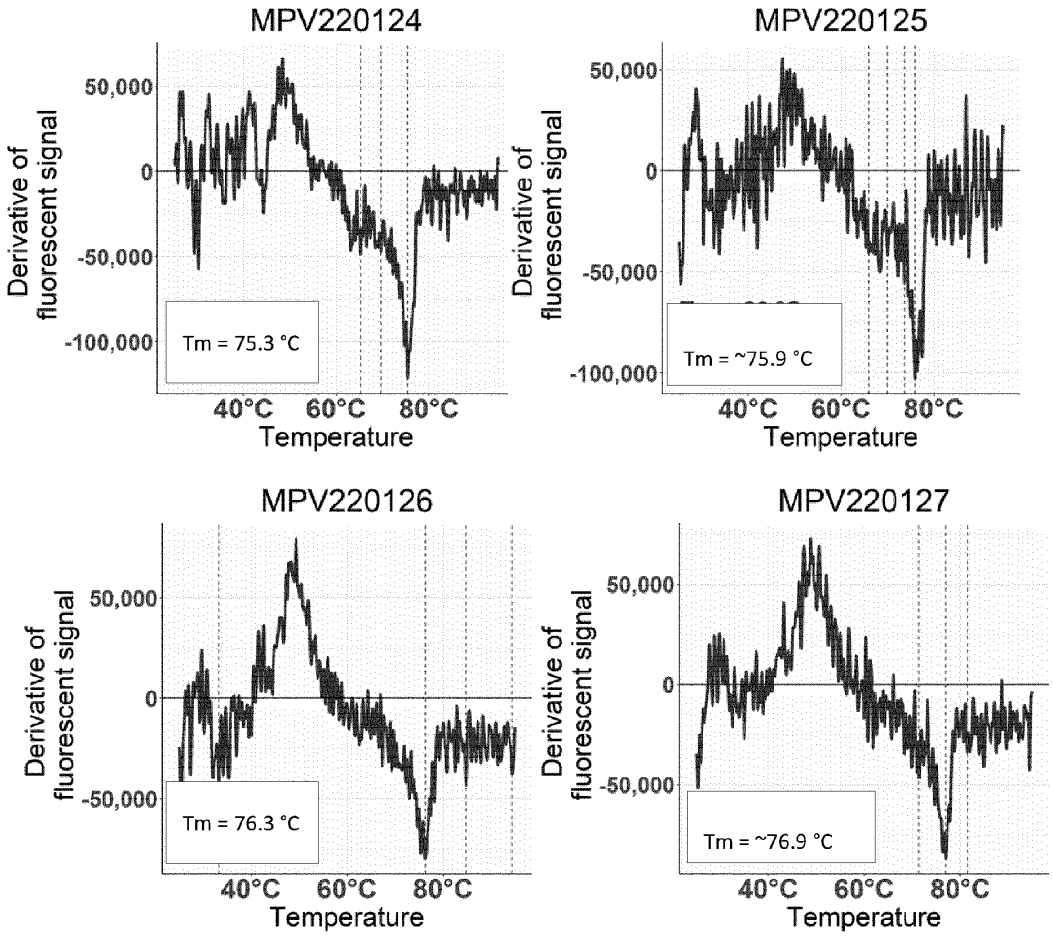
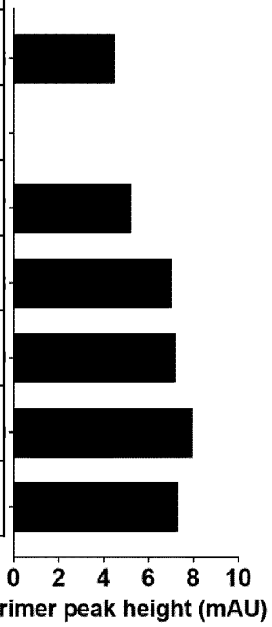


Fig. 9 continued

A

	69	112	149	209	231	313	404	445	453
	T	V	S	D	V	N	N	S	E
MPV220116		R		E	I				P
MPV220127		R		E	I		P		P
MPV220128		R	Y	E	I		P		P
MPV220129	W	R	Y	E	I		P		P
MPV220130		R	Y	E	I		P	Y	P
MPV220131		R	Y	E	I	W	P	Y	P



B

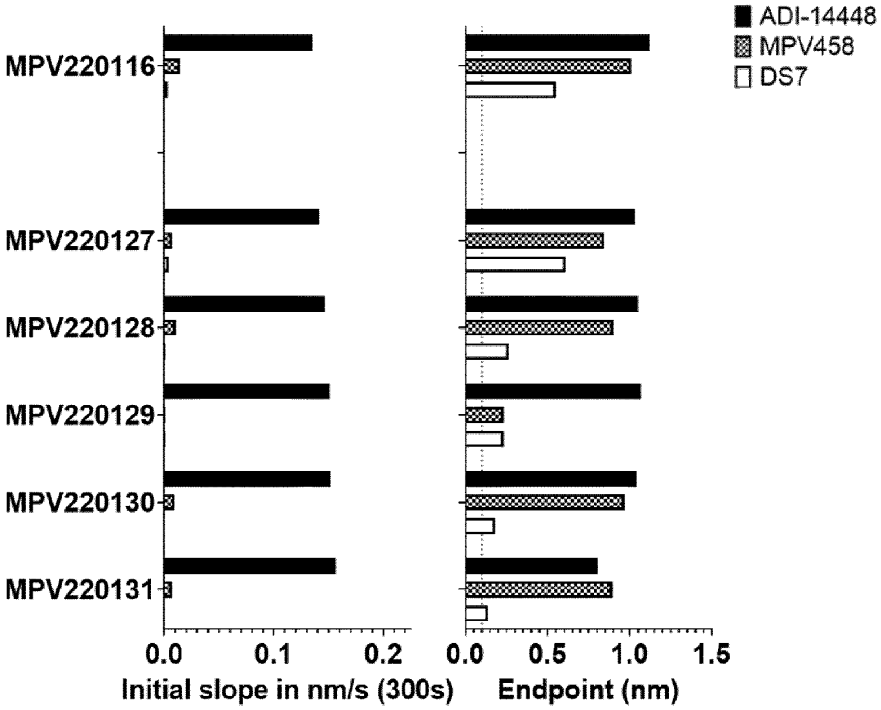


Fig. 10

C

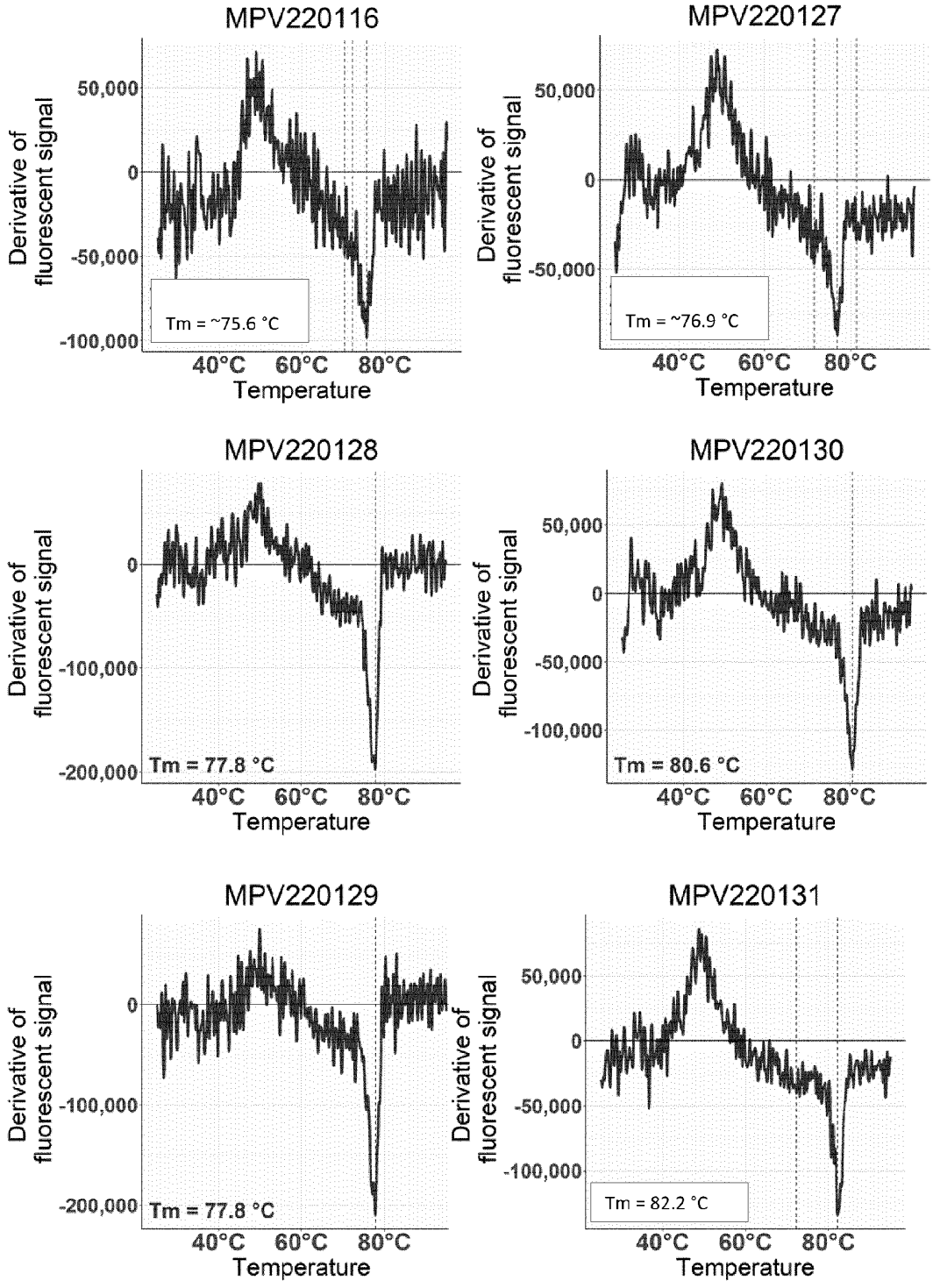
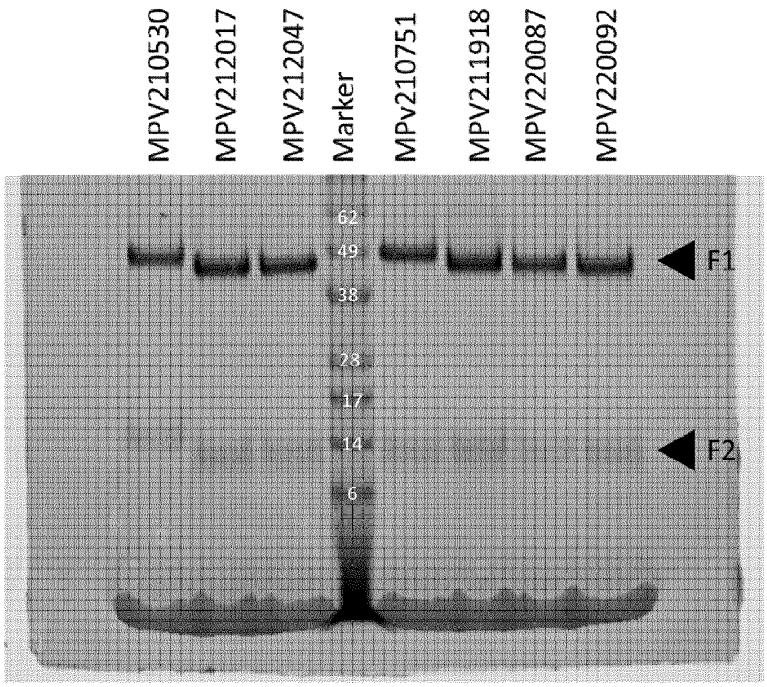


Fig. 10 - continued

A


MPV210530
MPV212017
MPV212047
Marker
MPv210751
MPV211918
MPV220087
MPV220092
62
49
38
28
17
14
6
F1
F2

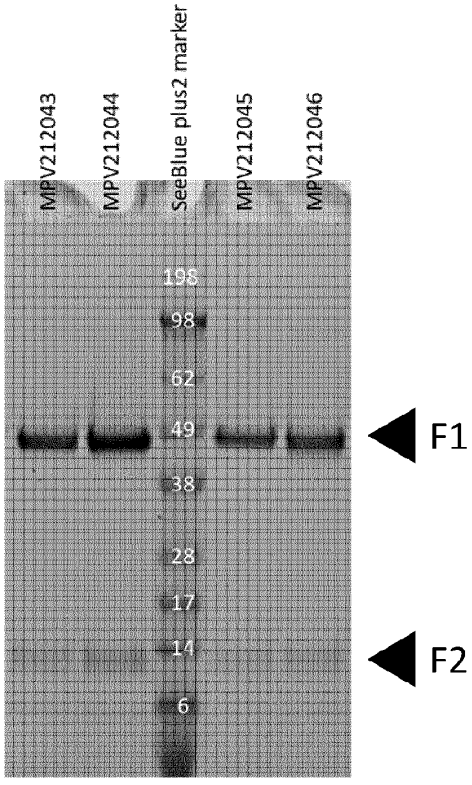

MPV212043
MPV212044
SeeBlue plus2 marker
MPV212045
MPV212046
198
98
62
49
38
28
17
14
6
F1
F2

Fig 11

B

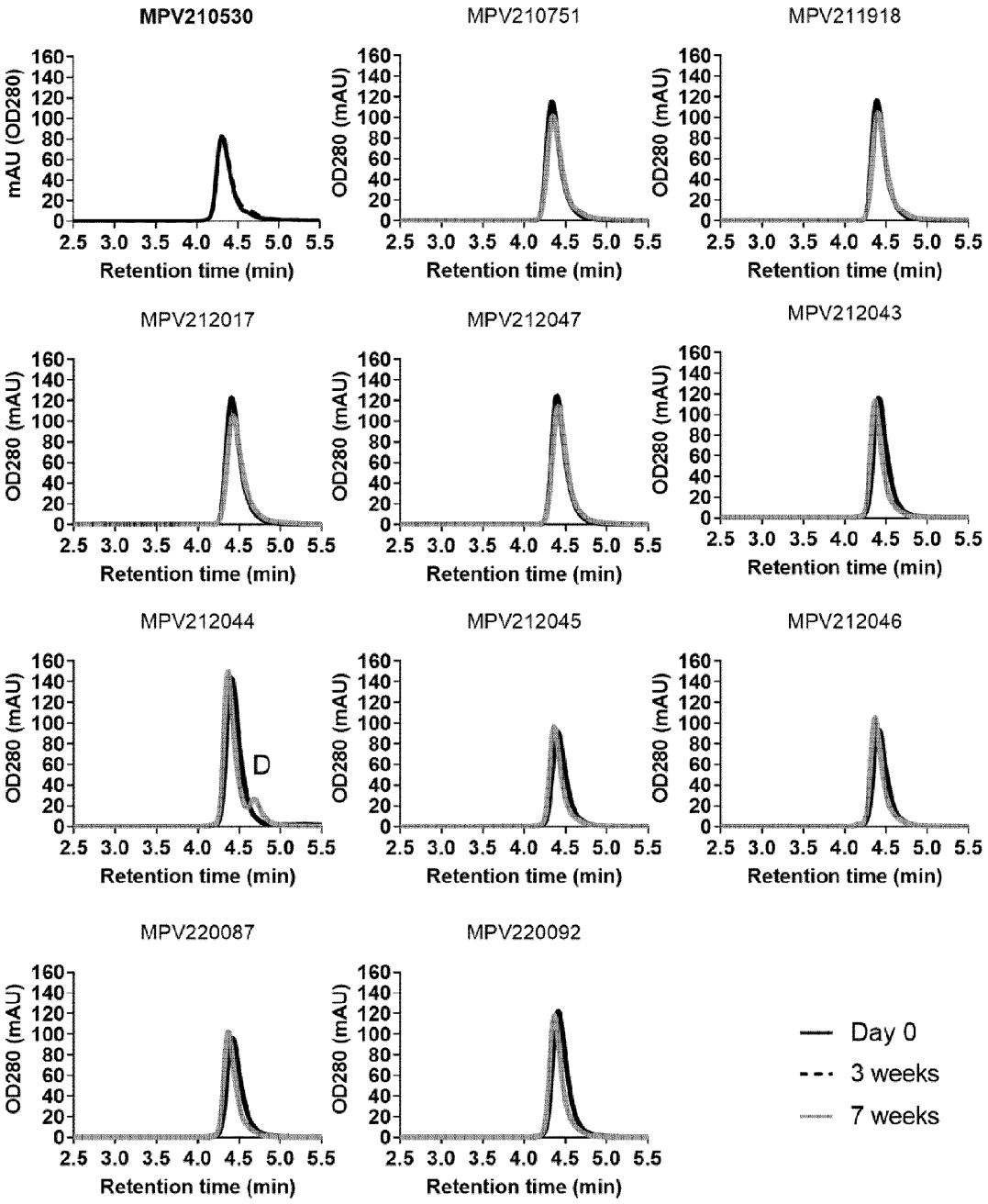


Fig 11 - continued

C

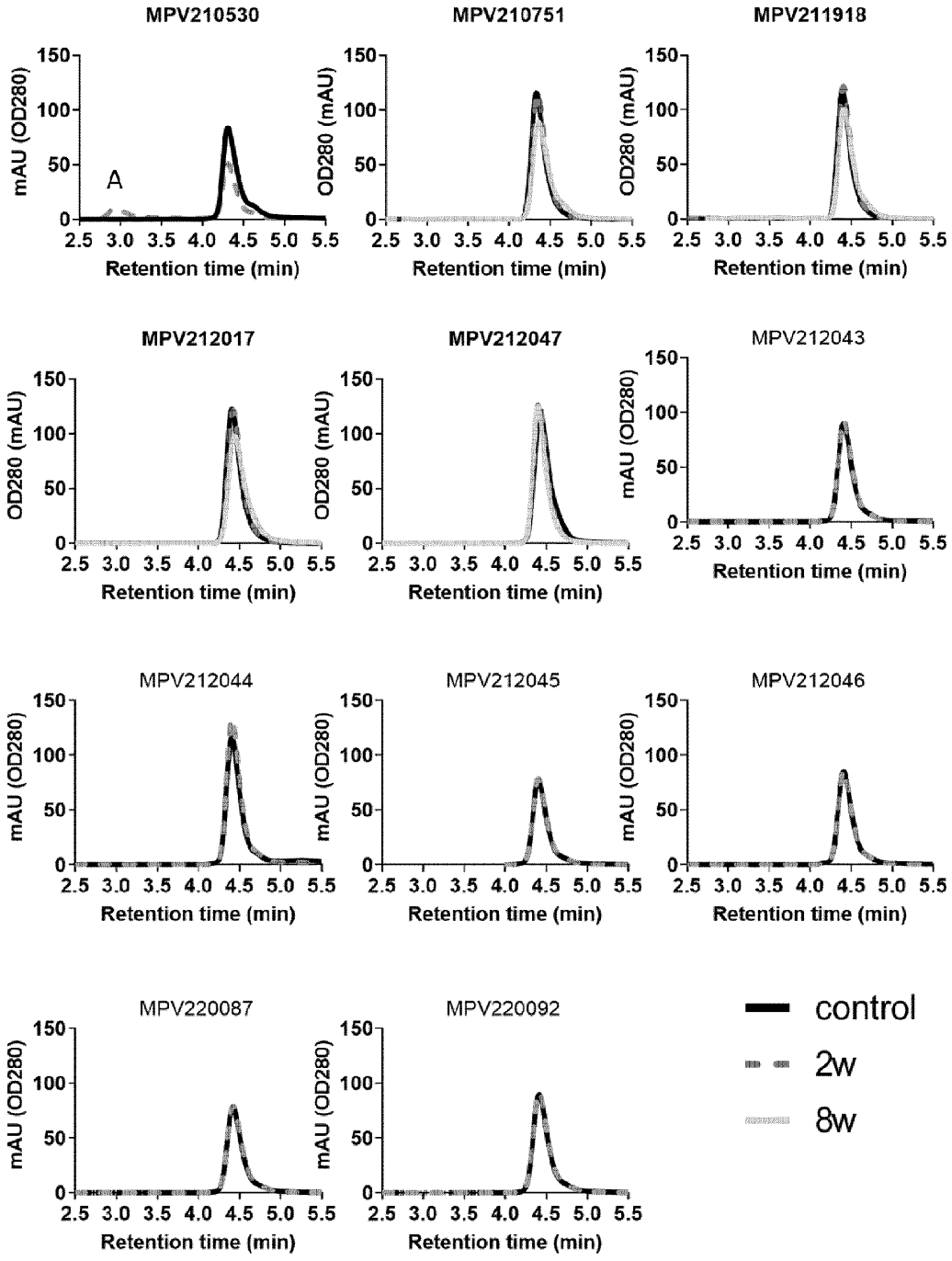


Fig 11 - continued

D

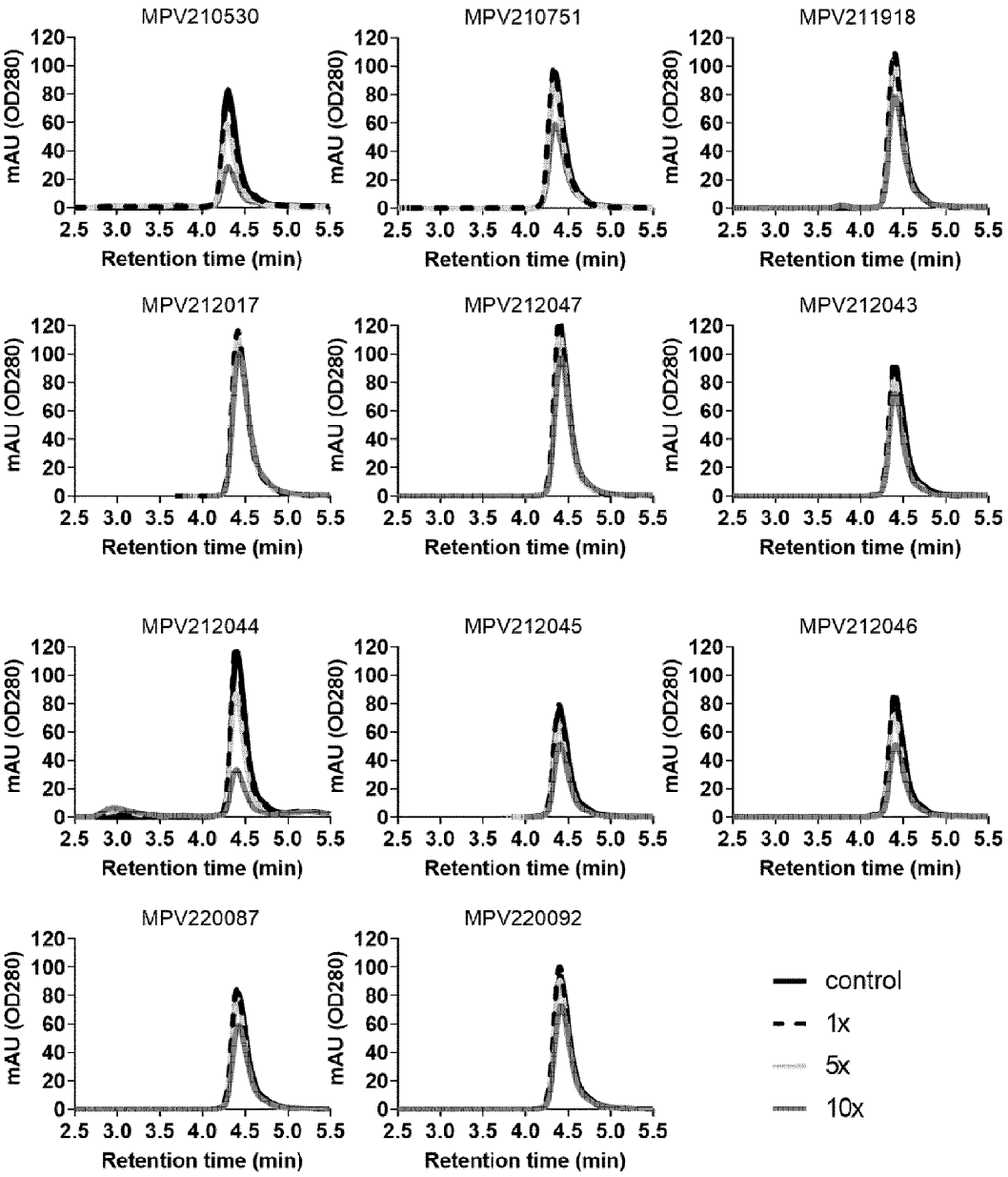


Fig 11 - continued

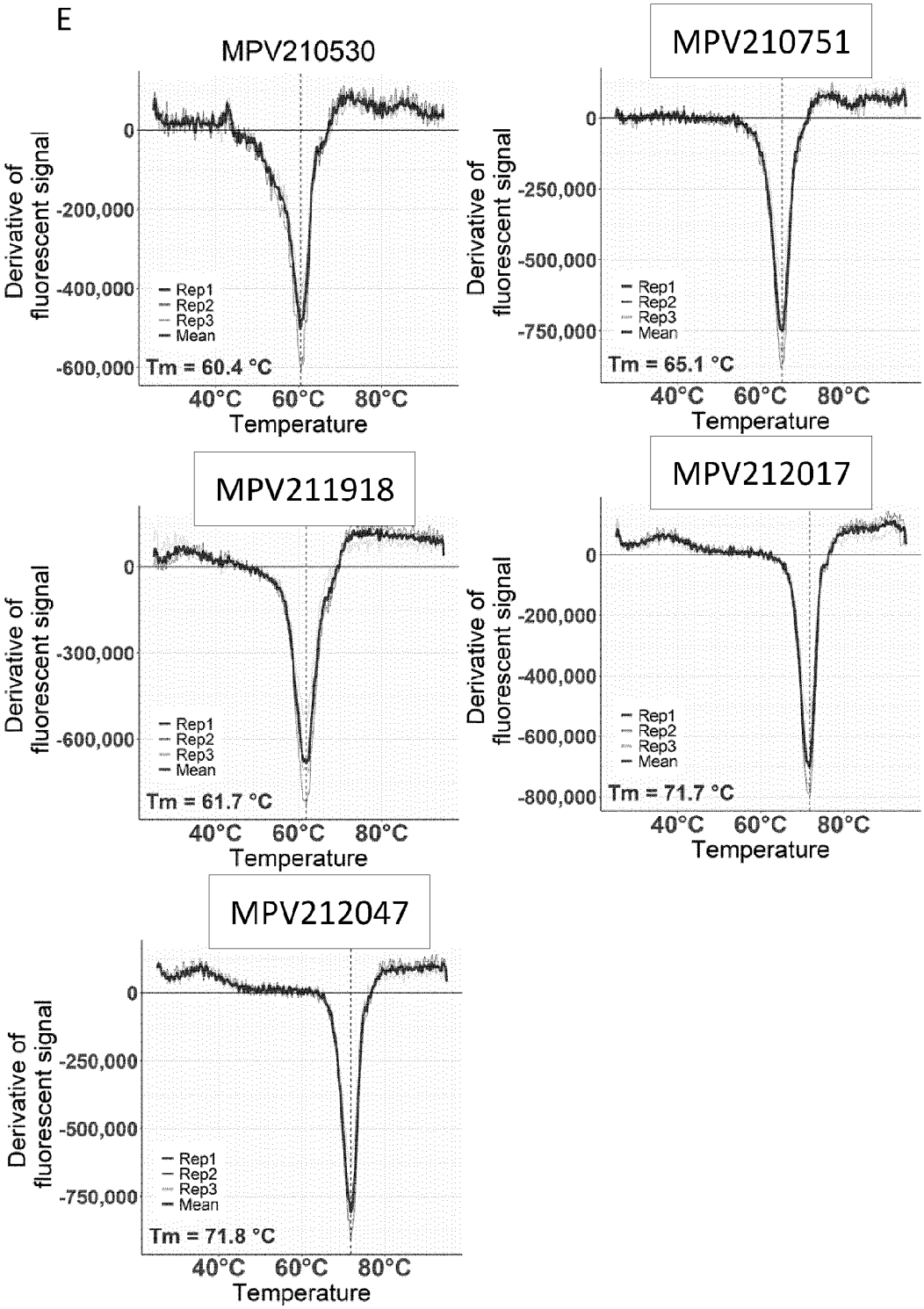


Fig 11 - continued

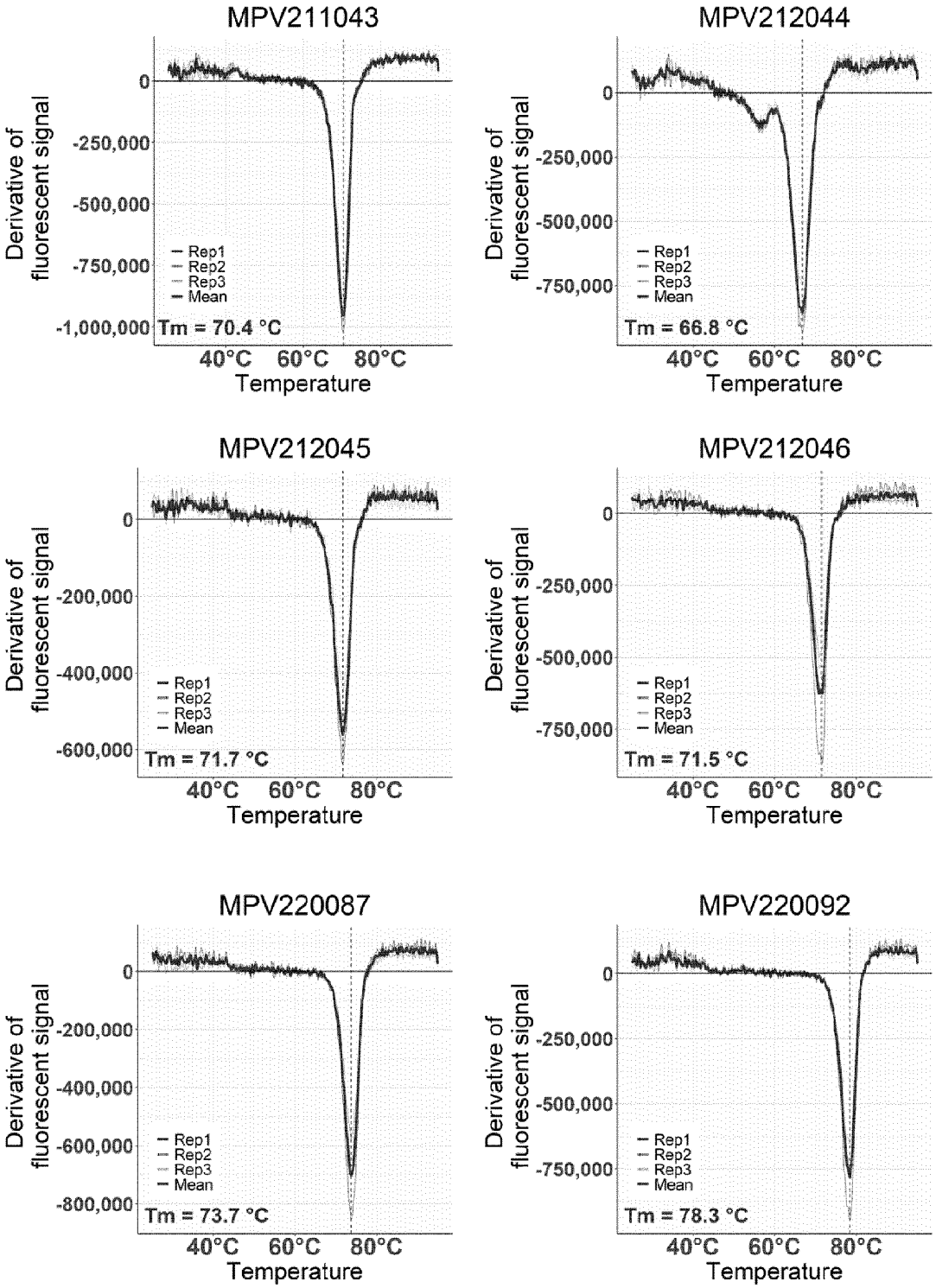


Fig 11 - continued

F

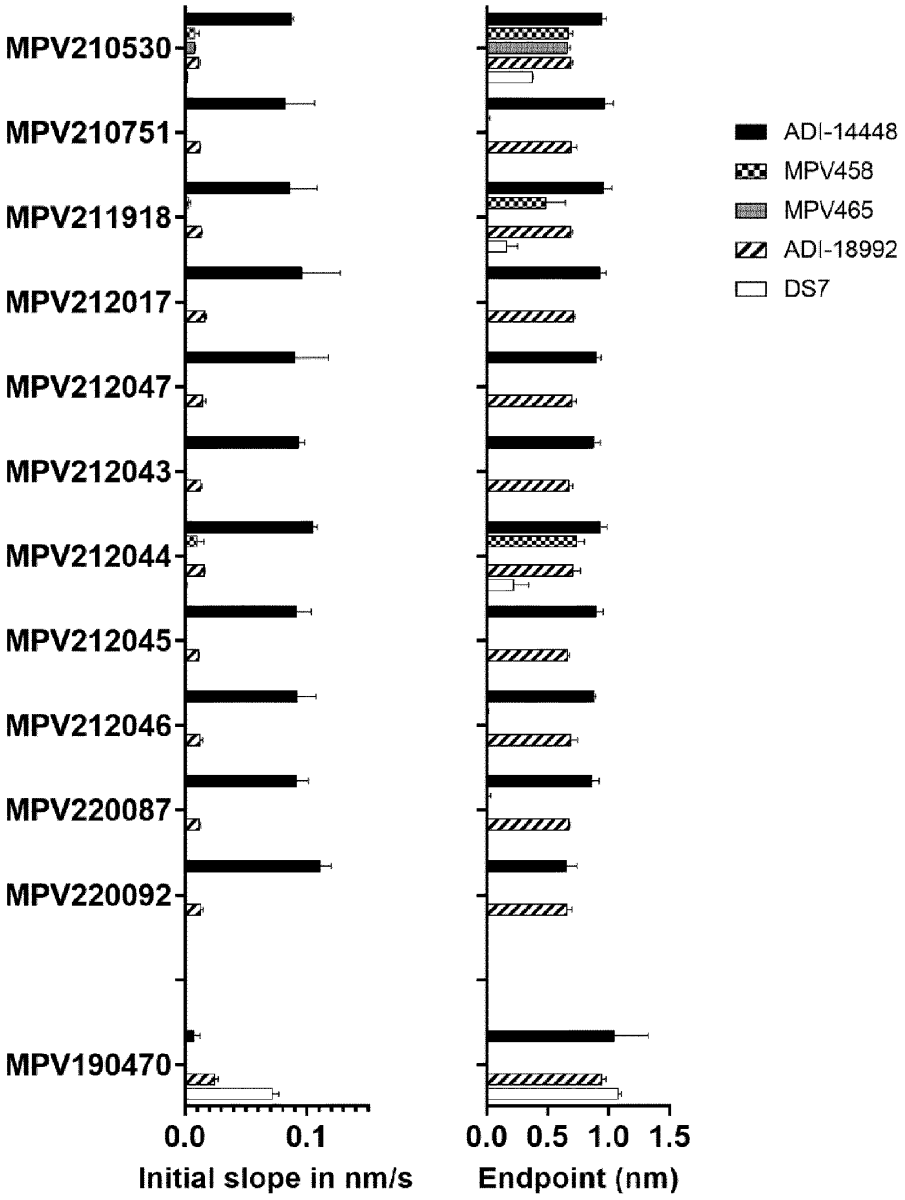


Fig 11 - continued

G

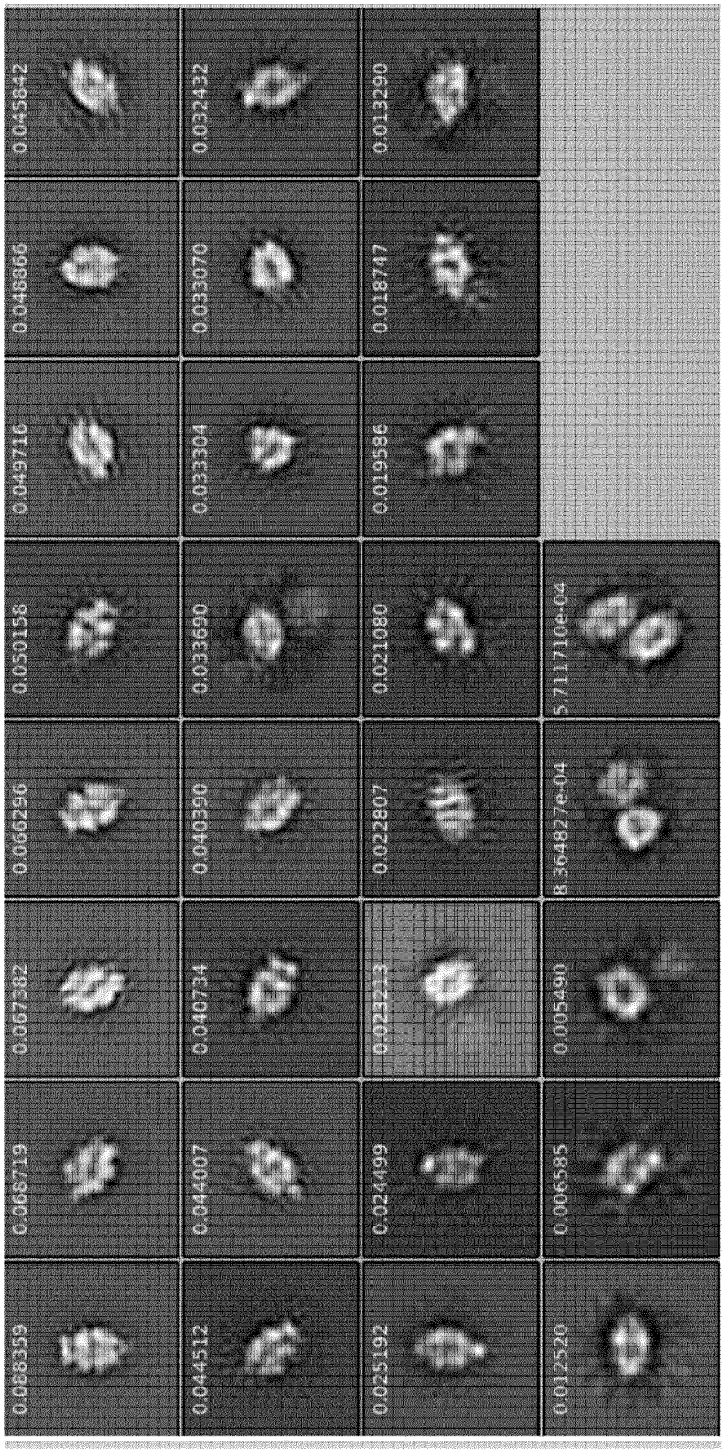


Fig 11 - continued

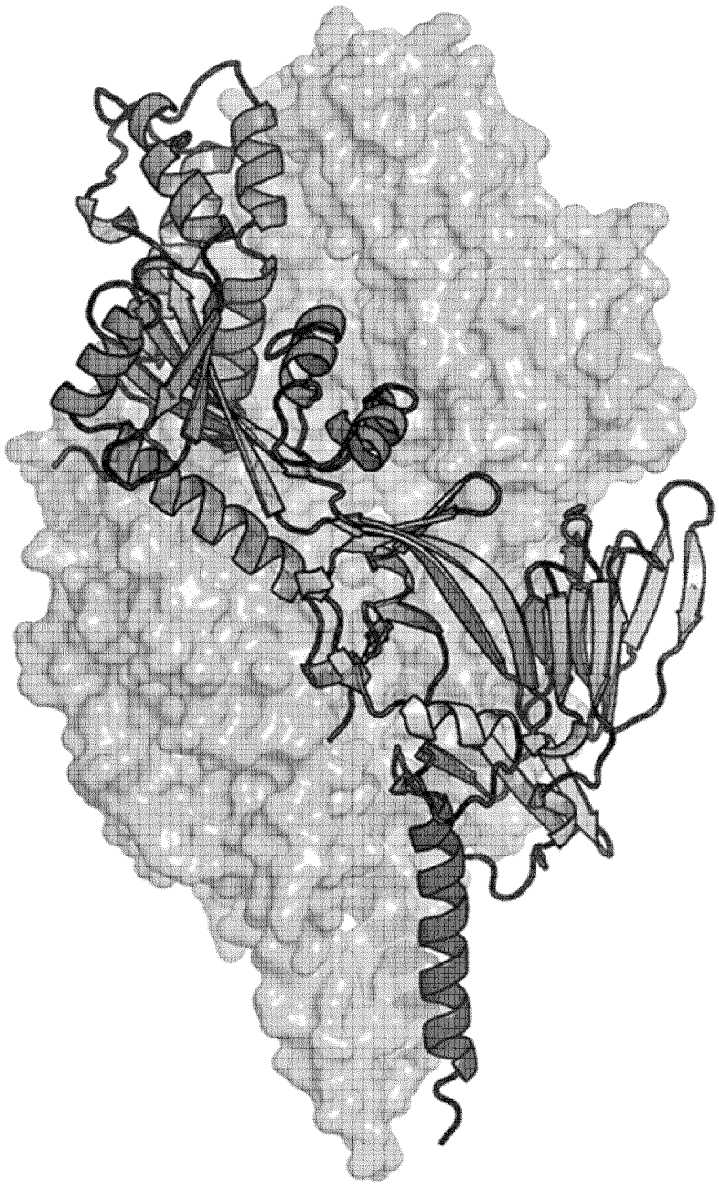
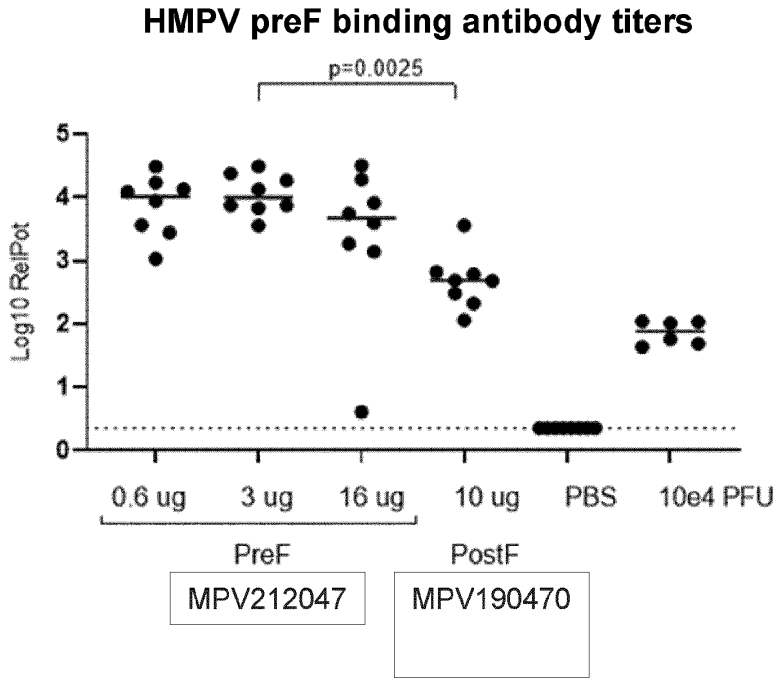


Figure 12

A.


HMPV preF binding antibody titers
p=0.0025
Log10 RelPot
5
4
3
2
1
0
0.6 ug
3 ug
16 ug
10 ug
PBS
10e4 PFU
PreF
PostF
MPV212047
MPV190470

B.

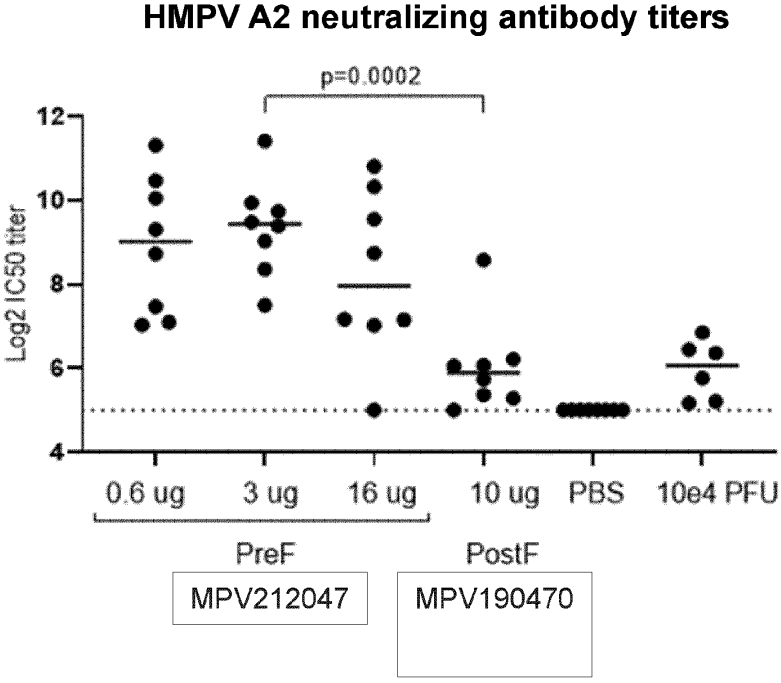

HMPV A2 neutralizing antibody titers
p=0.0002
Log2 IC50 titer
12
10
8
6
4
0.6 ug
3 ug
16 ug
10 ug
PBS
10e4 PFU
PreF
PostF
MPV212047
MPV190470

Figure 13

Figure 13, continued

C.

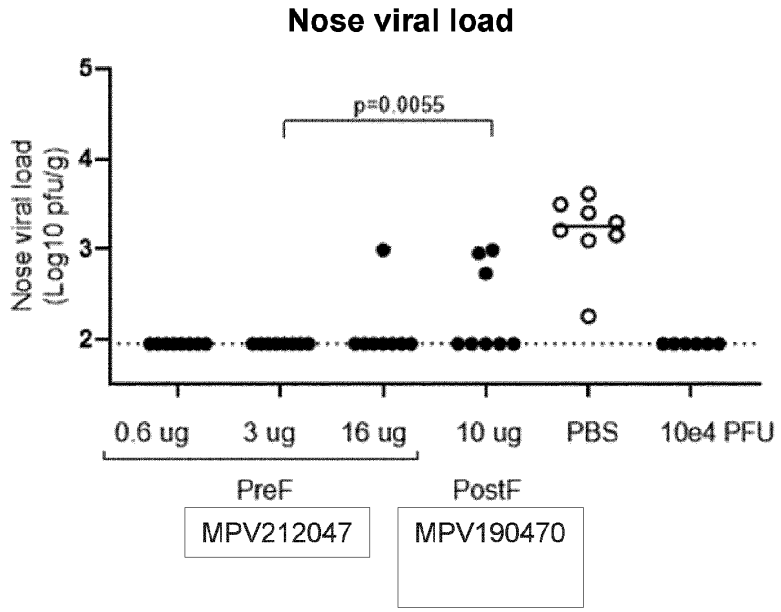
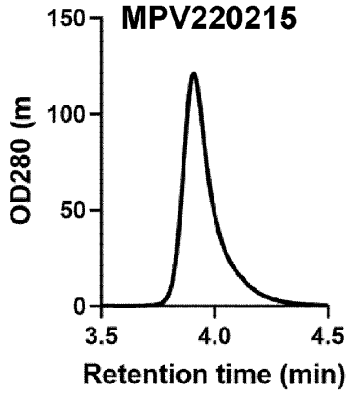


Figure 14

A.



B.

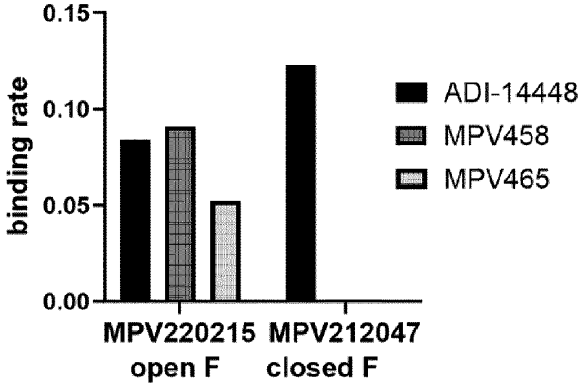
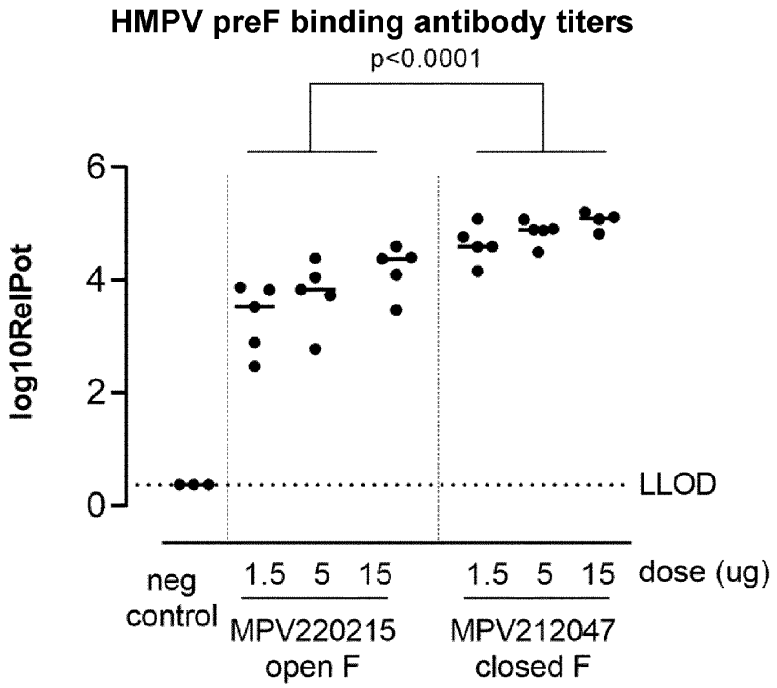
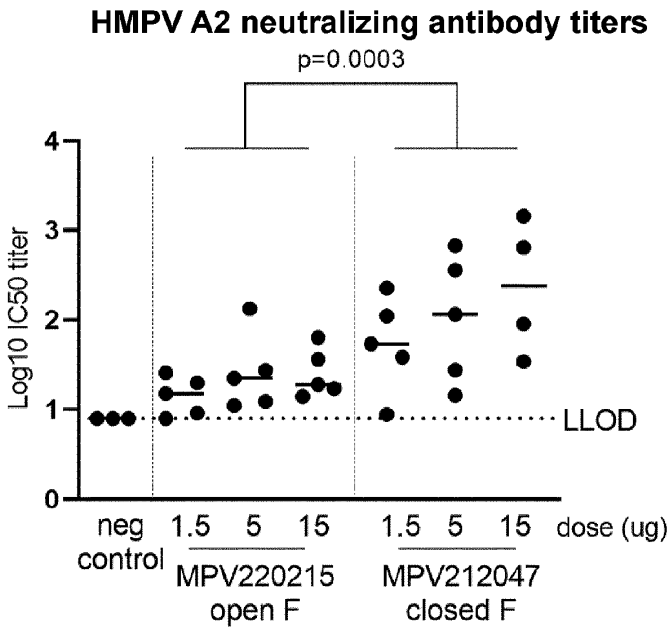


Figure 14, continued

C.



D.



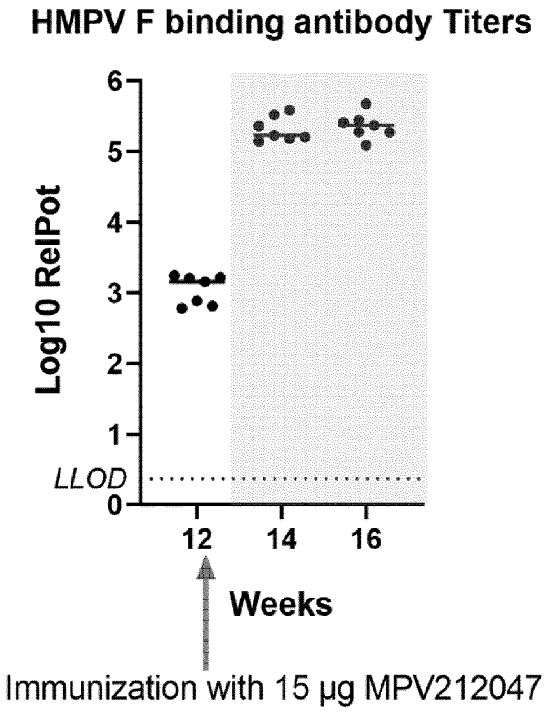
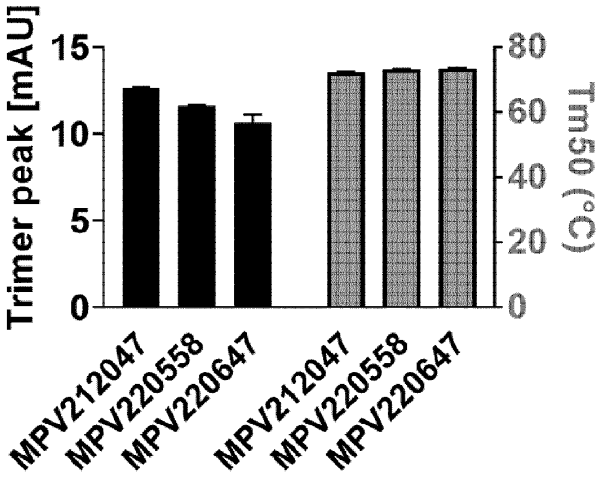

HMPV F binding antibody Titers
Log10 RelPot
6
5
4
3
2
1
LLOD
0
12
14
16
Weeks
Immunization with 15 µg MPV212047

Figure 15

Figure 16

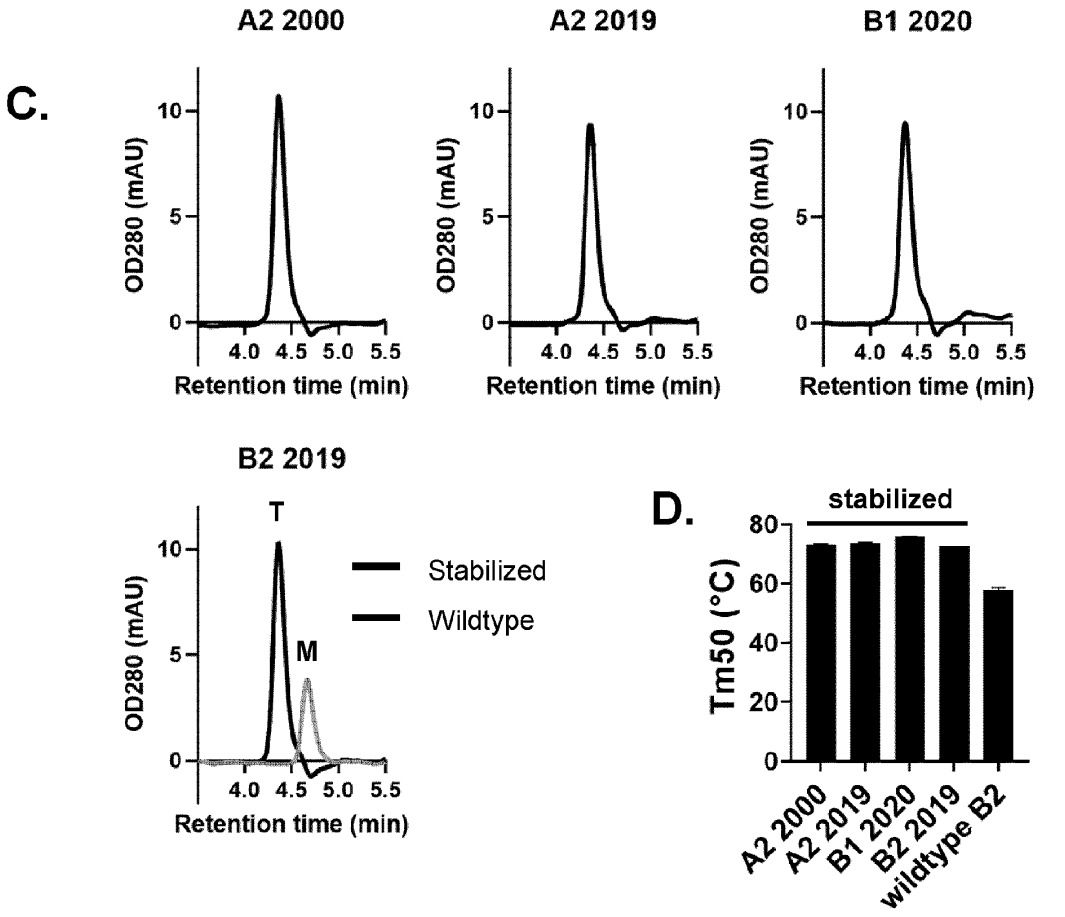
A.



B.

Construct ID	Subtype	Collection year	HMPV strain identifier	Genbank ID
MPV220647	A2	2000	TN/00/3-14	EU857553.1
MPV220639	A2	2019	HMPV/Yokohama.JPN/P9767/2019	BBI90013.1
MPV220640	B1	2020	B/NSW/WM2170539/17	QTW05440.1
MPV220641	B2	2019	2019_1360	QQY99338.1

Figure 16, continued



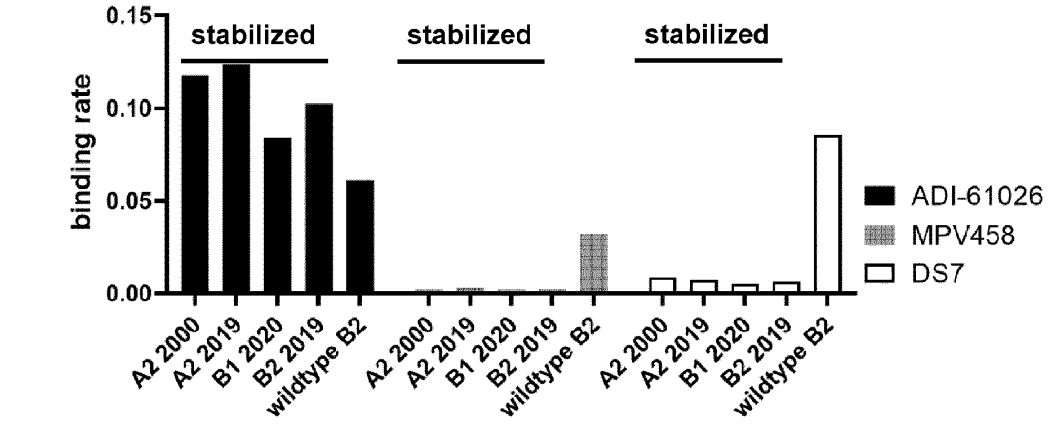
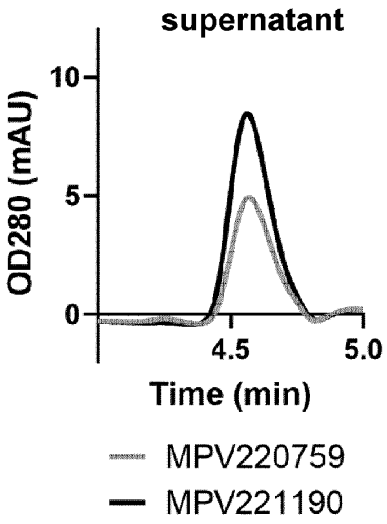
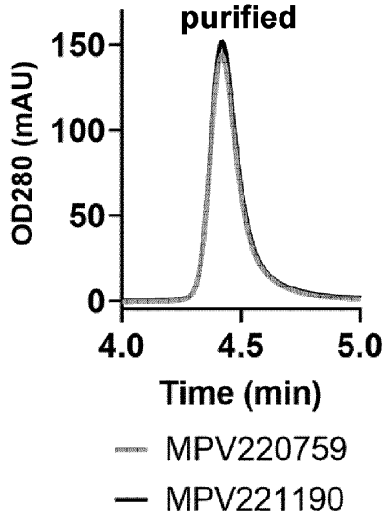


Figure 17

A.



B.



C.

	MPV220759	MPV221190
Determined weight (kDa)	157.0 (±0.668%)	157.4 (±0.595%)
Theoretical weight (kDa)	151.6	151.8
Likely conformation	Trimer	Trimer

D.

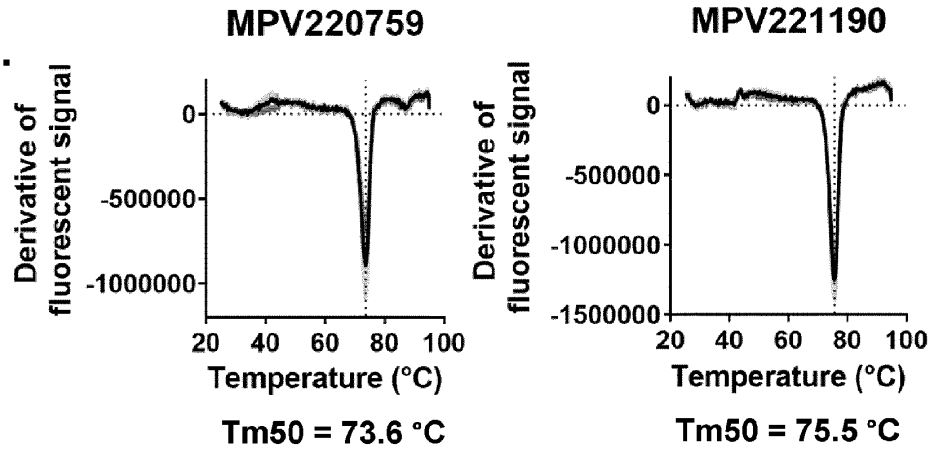
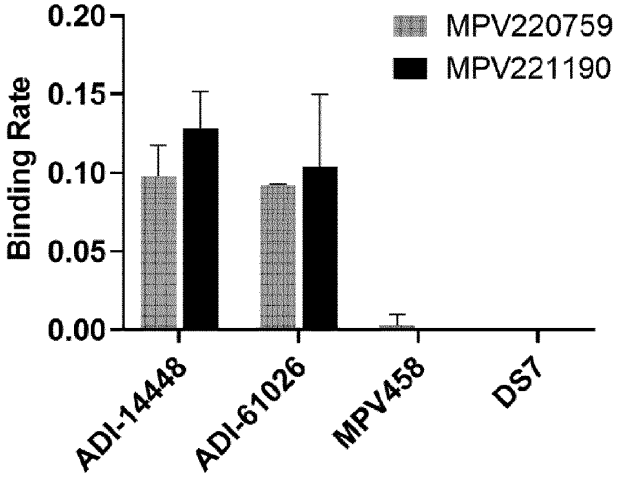
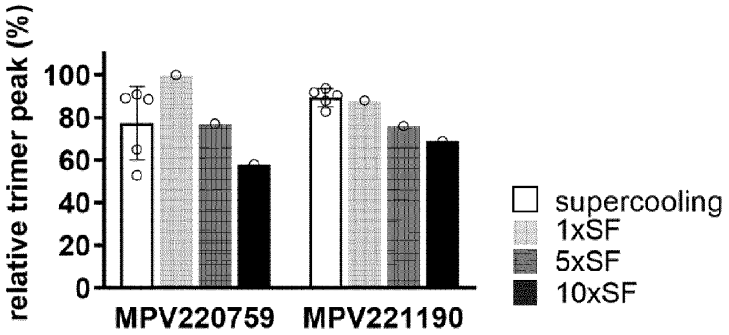


Figure 17, continued

E.



F.



G.

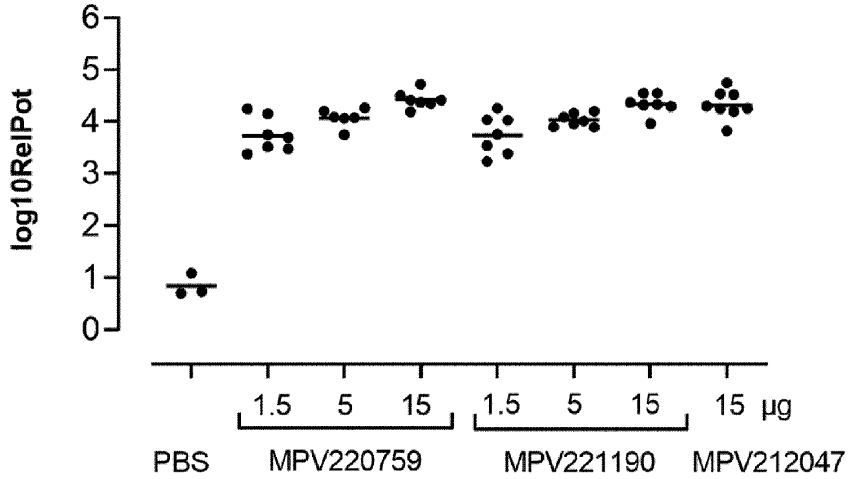
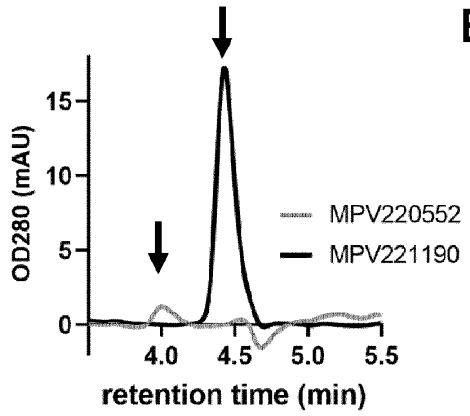


Figure 18

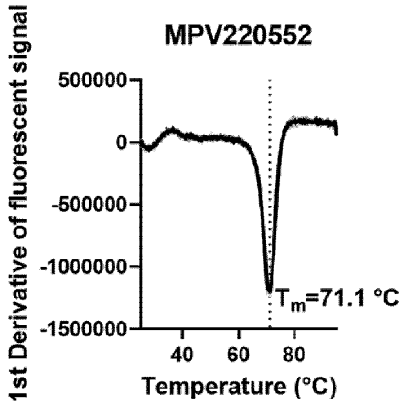
A.



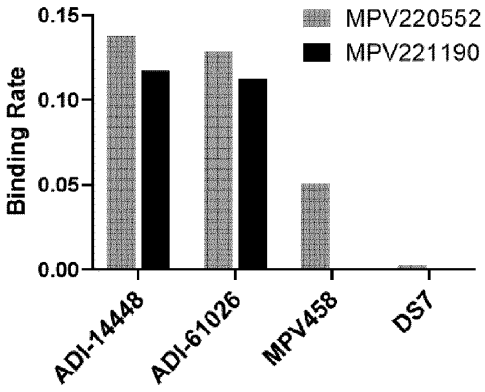
B.

MPV220552	
Determined weight (kDa)	177.9 (±0.221%)
Theoretical weight (kDa)	175.0
Likely conformation	Trimer

C.



D.



E.

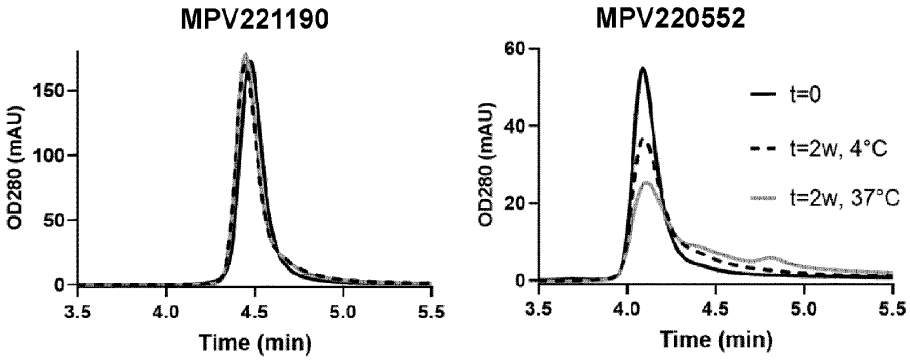


Figure 19

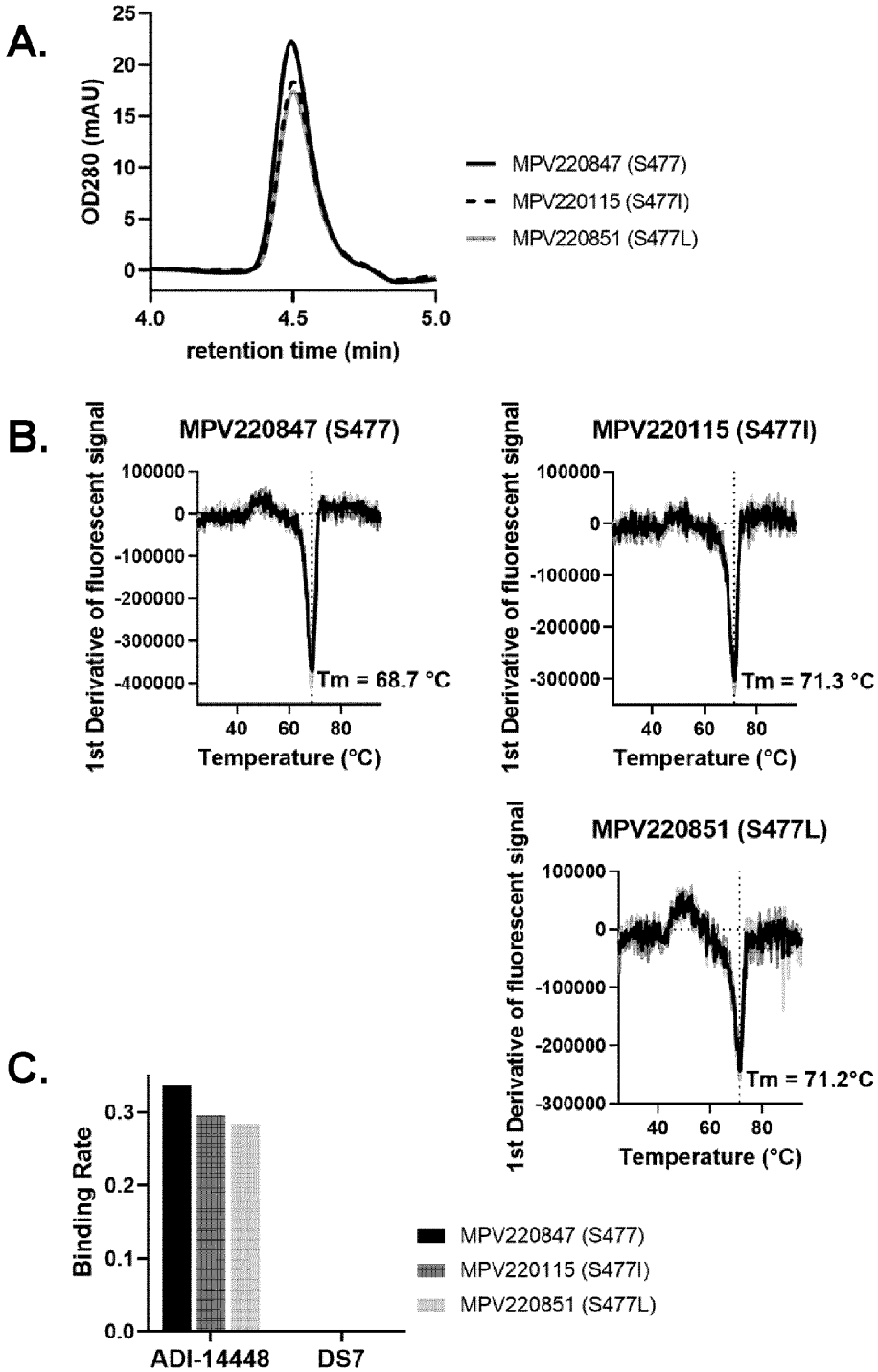

A.
OD280 (mAU)
retention time (min)
MPV220847 (S477)
MPV220115 (S477I)
MPV220851 (S477L)
B.
MPV220847 (S477)
Tm = 68.7 °C
MPV220115 (S477I)
Tm = 71.3 °C
MPV220851 (S477L)
Tm = 71.2°C
1st Derivative of fluorescent signal
Temperature (°C)
C.
Binding Rate
ADI-14448
DS7
MPV220847 (S477)
MPV220115 (S477I)
MPV220851 (S477L)

Figure 20

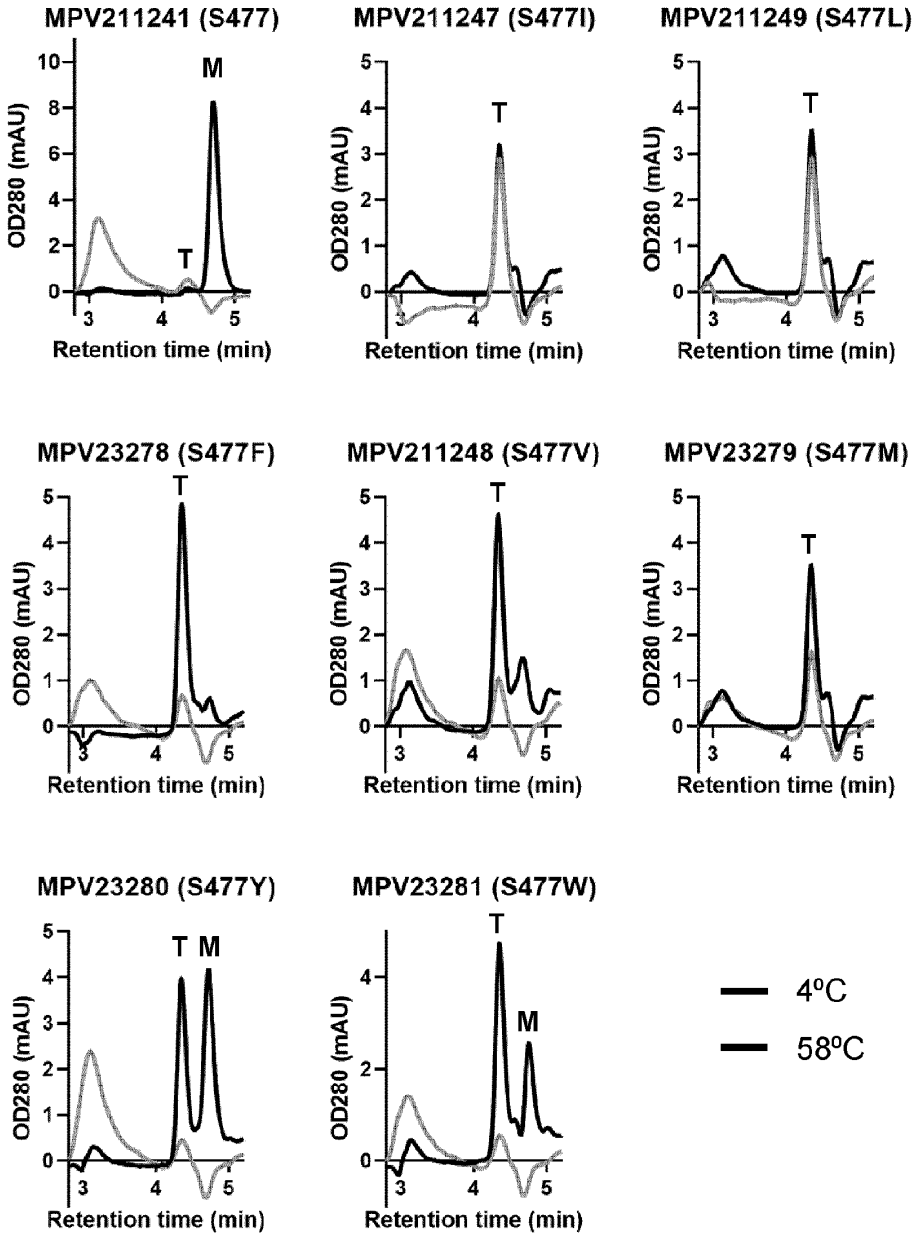

MPV211241 (S477)
MPV211247 (S477I)
MPV211249 (S477L)
MPV23278 (S477F)
MPV211248 (S477V)
MPV23279 (S477M)
MPV23280 (S477Y)
MPV23281 (S477W)
OD280 (mAU)
Retention time (min)
T
M
4°C
58°C

Figure 21

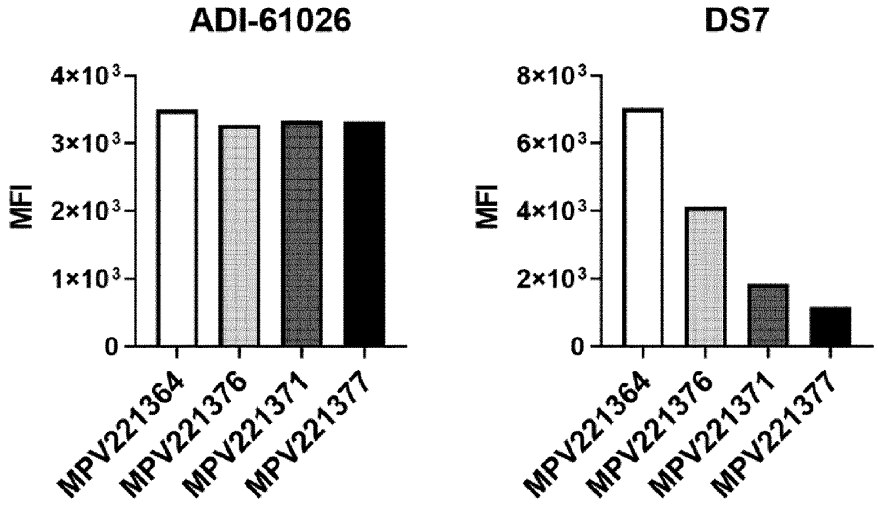

ADI-61026
DS7
MFI
4×10³
3×10³
2×10³
1×10³
0
8×10³
6×10³
4×10³
2×10³
0
MPV221364
MPV221376
MPV221371
MPV221377

Figure 22

A.

Construct	Description	P27 sequence
MPV23260	p27-B	RRRREAPQYMNYTINTTKNLNVSISKKRKRR
MPV23259	p27-A	RRRRELPRFMNYTLNNTKNTNVTLSKKRKRR
MPV23261	p27-A_ΔGlycan1	RRRRELPRFMQYTLNNTKNTNVTLSKKRKRR
MPV23262	p27-A_ΔGlycan2	RRRRELPRFMNYTLQNTKNTNVTLSKKRKRR
MPV23263	p27-A_ΔGlycan3	RRRRELPRFMNYTLNNTKNTQVTLSKKRKRR
MPV23264	p27-A_ΔGlycan1+2	RRRRELPRFMQYTLQNTKNTNVTLSKKRKRR
MPV23265	p27-A_ΔGlycan2+3	RRRRELPRFMNYTLQNTKNTQVTLSKKRKRR
MPV23266	p27-A_ΔGlycan1+3	RRRRELPRFMQYTLNNTKNTQVTLSKKRKRR
MPV23267	p27-A_ΔGlycan1+2+3	RRRRELPRFMQYTLQNTKNTQVTLSKKRKRR
MPV23268	p27-A_deletion-1	RRRRE---------NNTKNTNVTLSKKRKRR
MPV23269	p27-A_deletion-2	RRRRELPRFMNYTL----------KKRKRR

B.

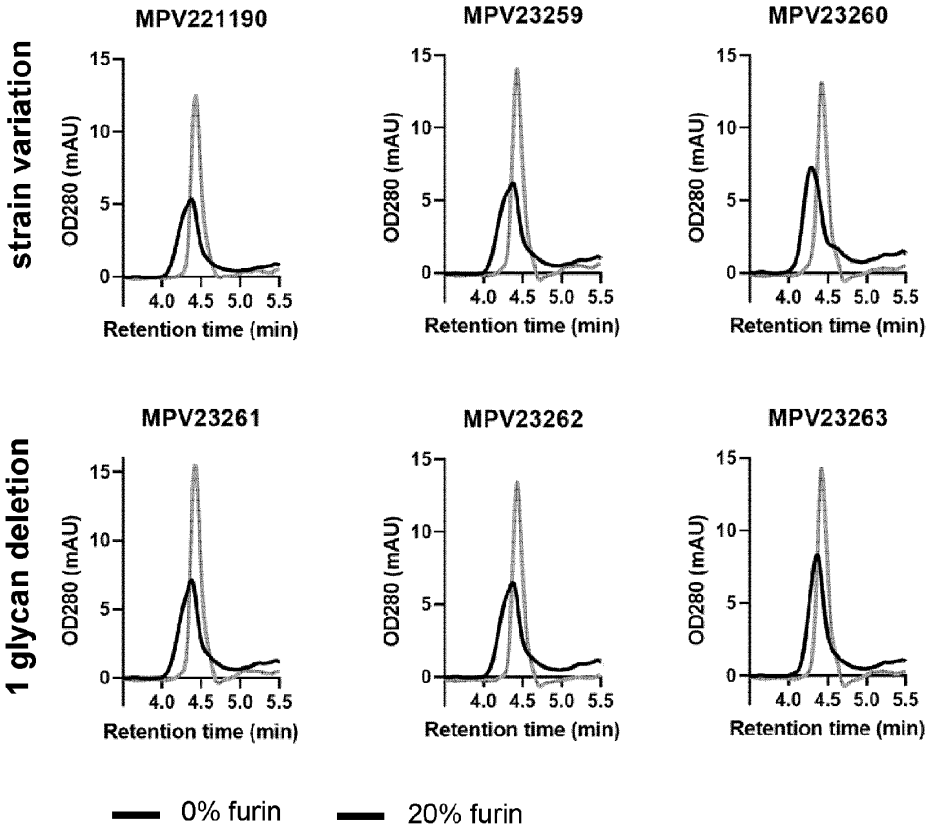
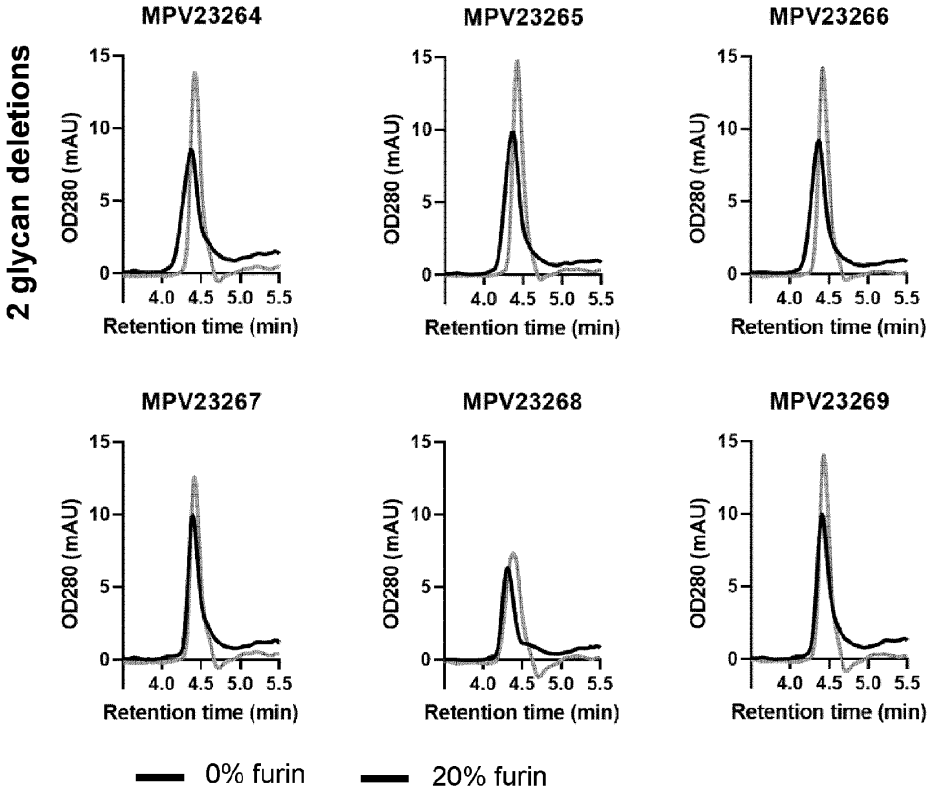


Figure 22, continued



C.

