Supplementary Information: Computational predictions of corroles as a class of Hsp90 inhibitors

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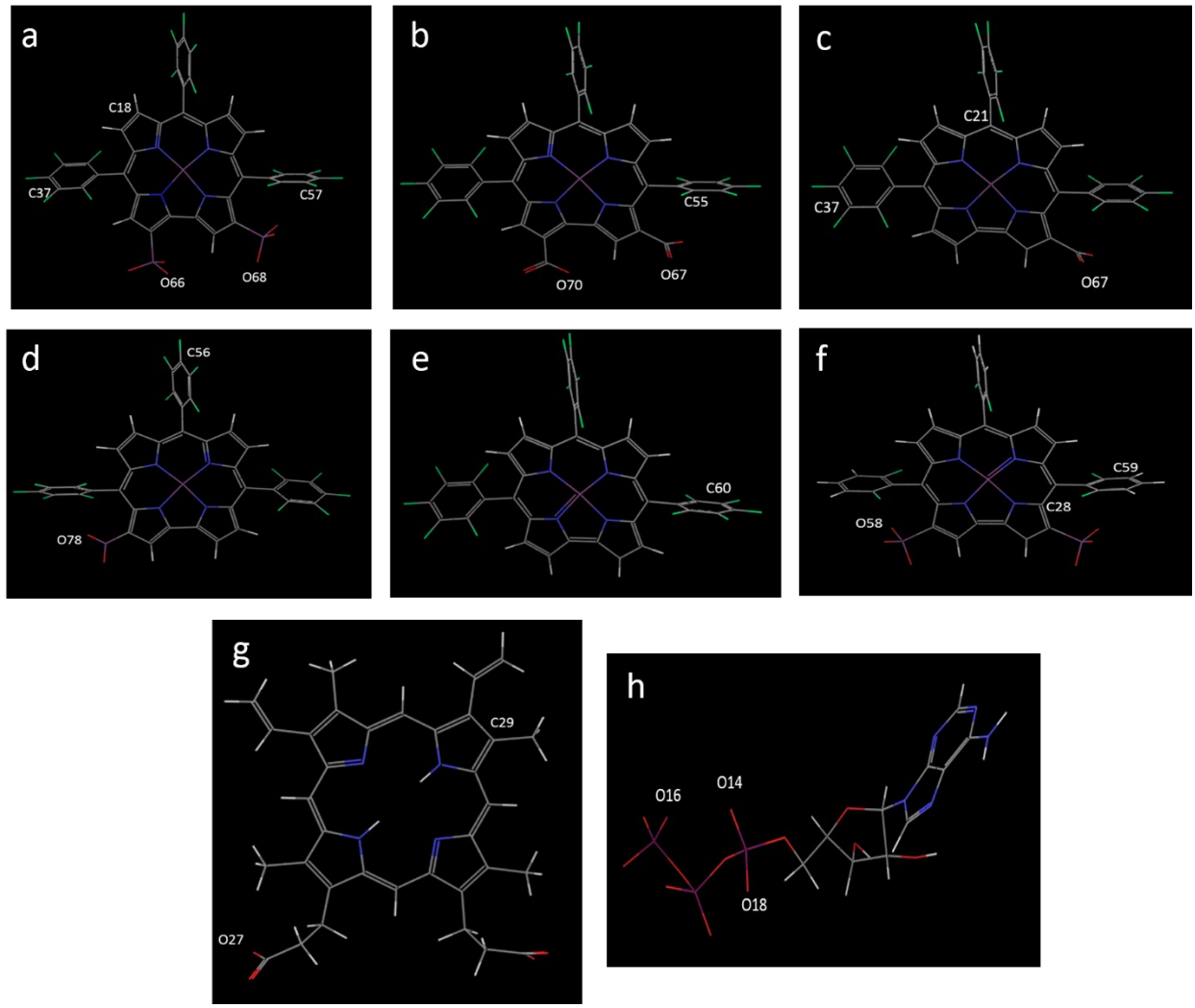

Fig. S1 Relevant atom positions for binding interactions with Hsp90 derived from docking – a) 1-Ga, b) 4-Ga, c) 5-Ga, d) 3-Ga, e) 2-Ga, f) 7-Ga, g) PPIX, and h) ATP.

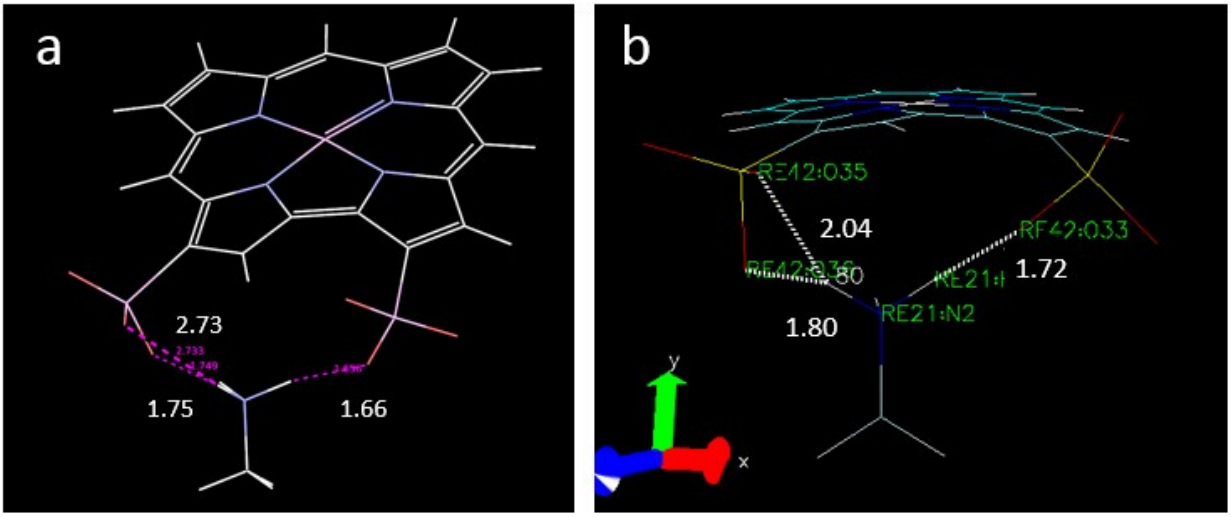

Fig. S2 Salt-bridge bond distances between the protonated amine of Lys112 with the sulfonate group of 1-Ga obtained from a) DFT, and b) FF calculations.

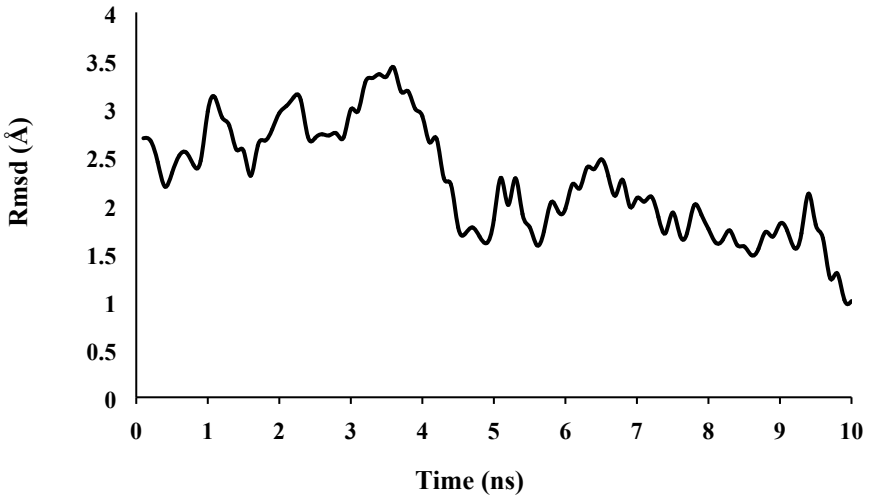

Fig. S3 Backbone RMSD with respect to the last frame for 1-10ns. (1-Ga).

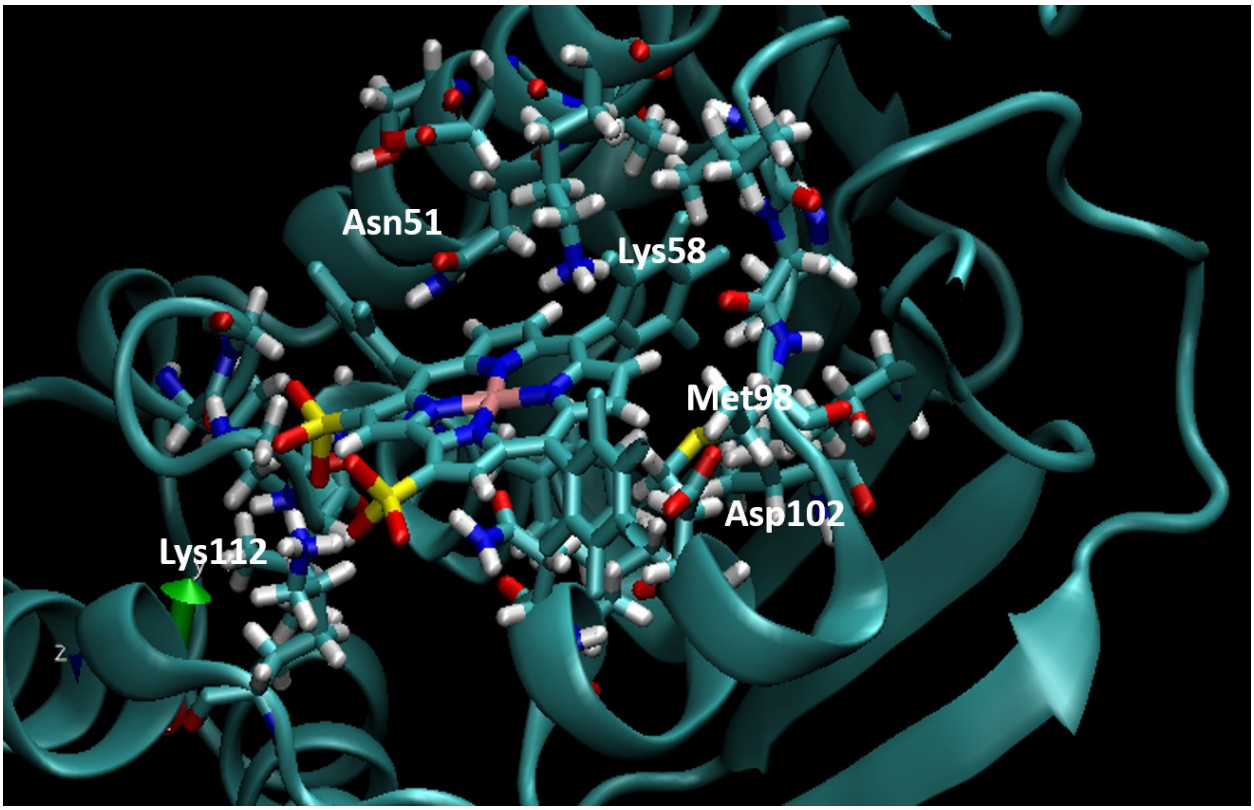

Fig. S4 Starting frame of 1-Ga to Hsp90 before 10ns MD was performed. The relevant residues are highlighted.

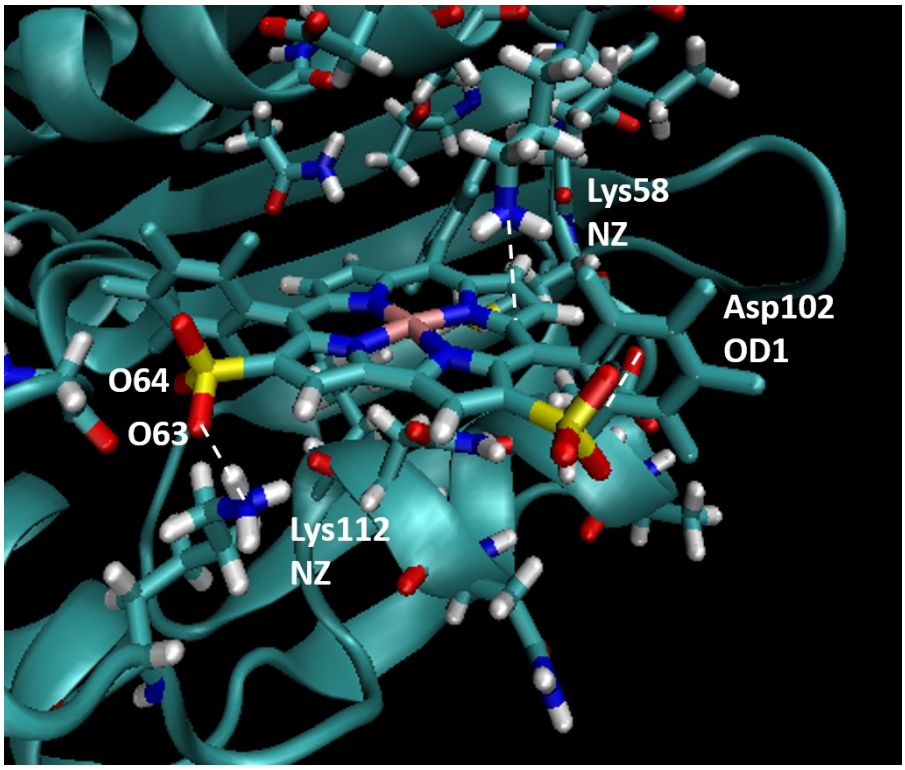

Fig. S5 Starting frame (obtained by replacing 7-Ga in its starting MD frame with 6-Ga) of 6-Ga to Hsp90 before 10ns MD was performed. Dotted lines indicate likely interactions. The relevant residues are highlighted.

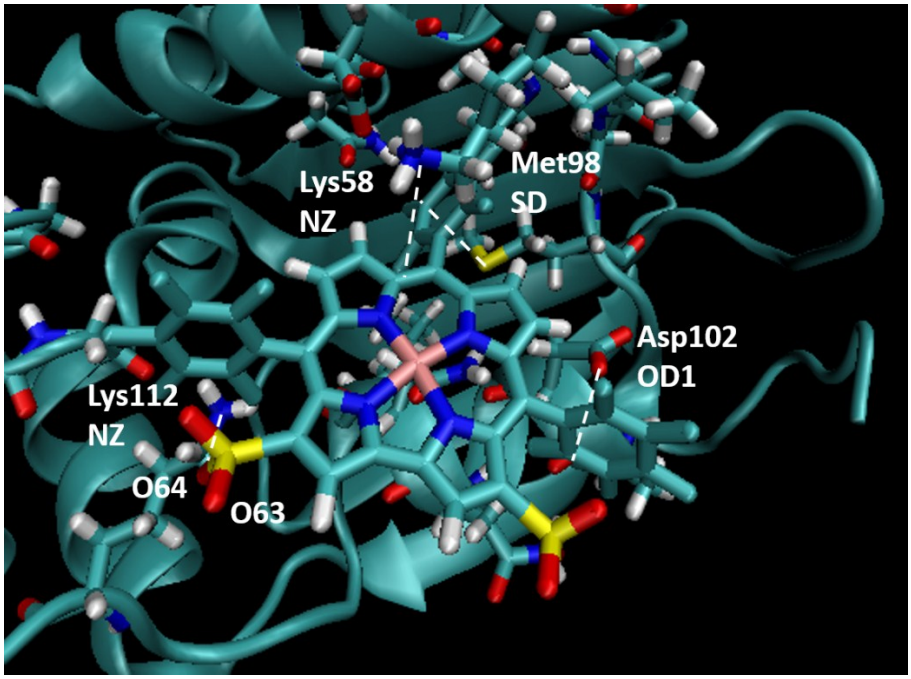

Fig. S6 Ending frame of 6-Ga to Hsp90 after 10ns MD was performed. Dotted lines indicate likely interactions. The relevant residues are highlighted.

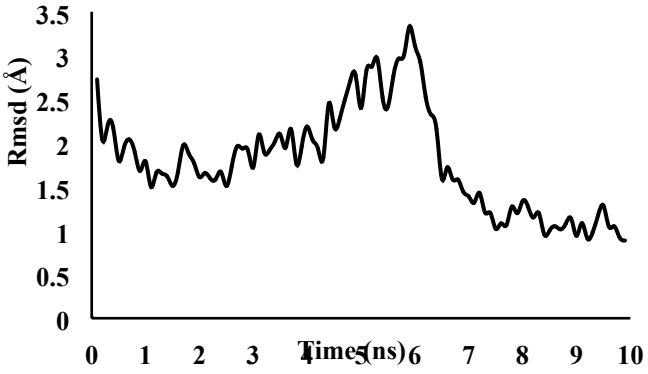

Fig. S7 Backbone RMSD with respect to the last frame for 1-10ns (6-Ga).

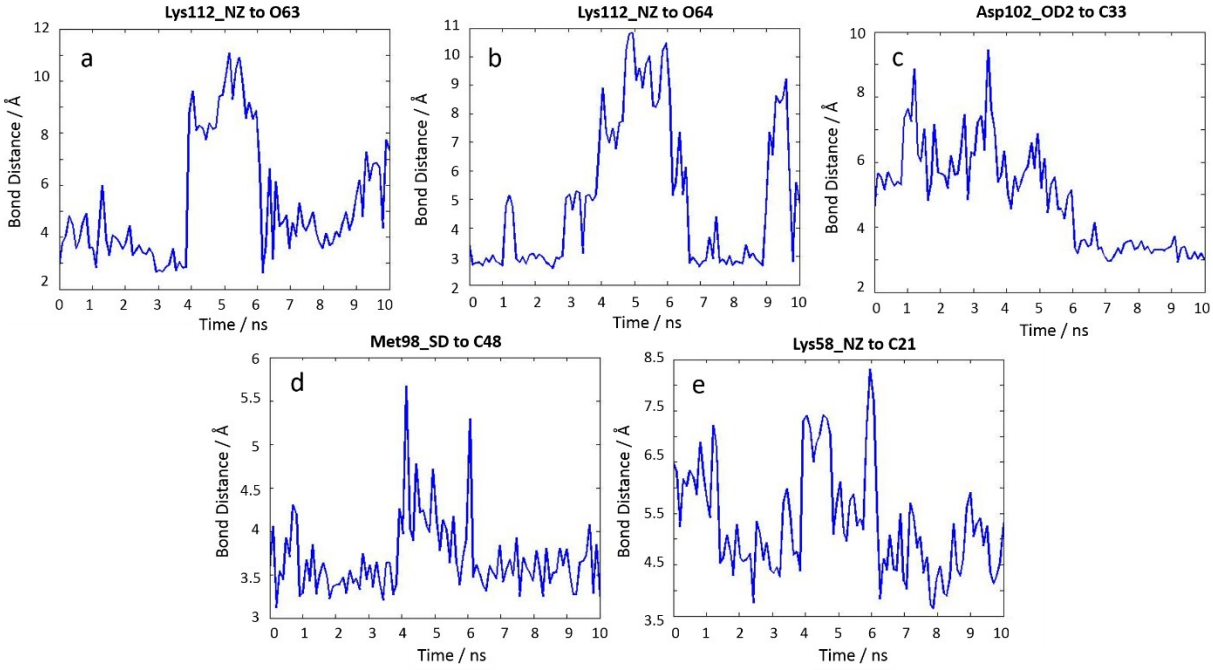

Fig. S8 10ns MD results of the interaction distances of 6-Ga to Hsp90. a) Lys112 NZ to O63, O68, b) Lys112 NZ to O64, c) Asp102 OD2 to C33, d) Met98 SD to C48, e) Lys58 NZ to C21.

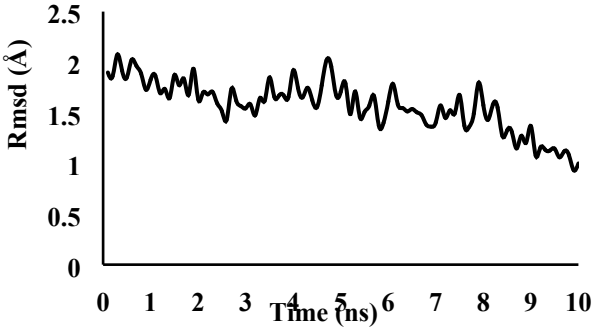

Fig. S9 Backbone RMSD with respect to the last frame for 1-10ns (7-Ga).

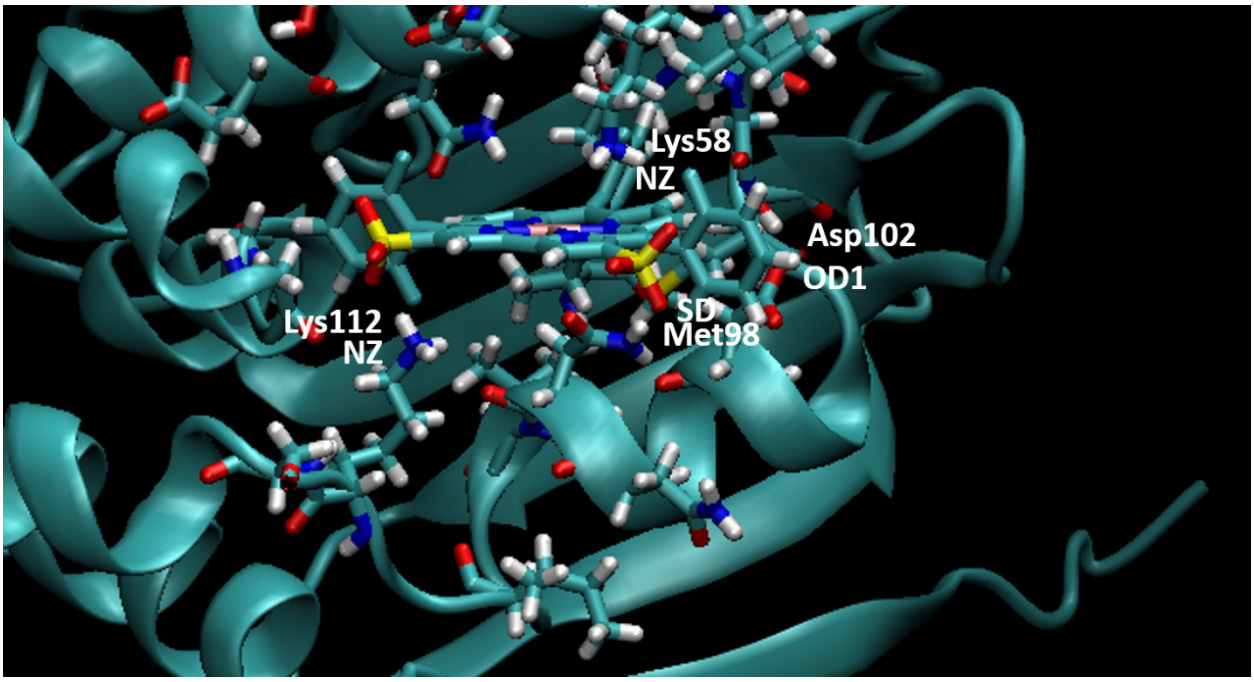

Fig. S10 Starting frame of 7-Ga to Hsp90 before 10ns MD was performed. The relevant residues are highlighted.

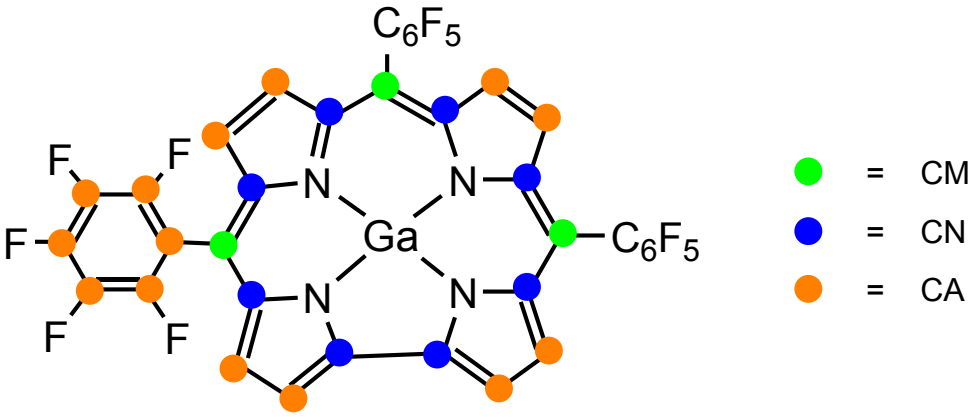

Fig. S11 General carbon atom framework of corrole for MD, where CM, CN, and CA are carbon atoms.

Table. S1 Summary of the AMBER atom types.

Atom type	Mass (amu)	Polarity	Comment
CA	12.01	0.36	
CM	12.01	0.36	
CN	12.01	0.36	
F	19	0.32	
Ga	69.723	0	
HA	1.008	0.167	
N1	14.01	0.53	
N2	14.01	0.53	
N3	14.01	0.53	
N4	14.01	0.53	
O	16	0.434	

S	32.06	2.9

Table. S2 Summary of the AMBER non-bonding atom types.

Atom type	Atomic Radius (Å)	Eps(kcal.mol^{-1})	Comment
CA	1.908	0.086	
CM	1.908	0.086	
CN	1.908	0.086	
F	1.75	0.061	
Ga	1.9	0.415	
HA	1.459	0.015	
N1	1.824	0.17	
N2	1.824	0.17	
N3	1.824	0.17	
N4	1.824	0.17	
O	1.6612	0.21	
S	2	0.25	
Ga	1.9	0.415	

Table. S3 Summary of the AMBER parameters for bond stretching.

Atom types	K(kcal.mol^{-1}Å $^{-2}$)	Equilibrium bond length (Å)

CA-CA	470	1.4
CA-CM	425	1.433
CA-CN	470	1.4
CA-F	385	1.359
CA-HA	365	1.08
CA-S	265	1.75
CM-CN	480	1.41
Ga-N1	300	1.86
Ga-N2	300	1.87
Ga-N3	300	1.87
Ga-N4	300	1.86
O –S	540	1.69
CA-N1	425	1.381
CA-N2	425	1.381
CA-N3	425	1.381
CA-N4	425	1.381
CN-CN	478	1.39
N1-CN	483.1	1.32
N2-CN	483.1	1.35
N3-CN	483.1	1.35
N4-CN	483.1	1.32

Table. S4 Summary of the AMBER parameters for angle bending.

Atom types	**K(kcal.mol^{-1}Å $^{-2}$)**	**Theta (deg.)**

CA-CA-CM	67.2	120.5
CA-CA-S	79.49	122.5
CN-CA-S	79.49	131.8
CA-CM-CN	67.2	120.4
CN-CM-CN	67.2	119.1
CA-CN-CM	34	126.1
CA-CN-CN	67.2	139.3
CM-CN-N2	70.2	127.8
CM-CN-N3	70.2	127.5
CM-CN-N4	70.2	121.8
CM-CN-N1	70.2	124.3
CN-CN-N4	70.2	114.4
CN-CN-N1	70.2	110.1
N1-Ga-N2	30	91.7
N2-Ga-N3	30	96.7
N3-Ga-N4	30	91.2
N4-Ga-N1	30	80.4
CN-N1-CN	67.1	110.5
CN-N2-CN	67.1	109.9
CN-N3-CN	67.1	109.7
CN-N4-CN	67.1	110.5
CN-N1-Ga	31.5	118.5
CN-N4-Ga	31.5	116.5
CA-S -O	42.78	114.2
O -S –O	46.66	103.1
N1-CN-CA	69.83	107.96
N2-CN-CA	69.83	108.74
N3-CN-CA	69.83	108.79
N4-CN-CA	69.83	107.77
Ga-N2-CN	31.5	123.5
Ga-N3-CN	31.5	123.6
N1-Ga-N3	30	171.5
N2-Ga-N4	30	171.6
CA-CA-CA	65	120
CA-CA-F	70	121
CA-CA-HA	50	120
CA-CN-CM	35	126.1

Table. S5 Summary of the AMBER parameters for dihedral torsions.

Atom types	Path	V(kcal.mol^{-1}rad^{-1})	Phase(deg.)	Period

CA-CA-S -O	6	7.8	64.6	2
CN-CA-S -O	6	7.8	49.1	2
CA-CM-CN-CA	4	14.5	180	2
CA-CM-CN-N1	4	14.5	180	2
CA-CM-CN-N4	4	14.5	180	2
CA-CM-CN-N2	4	14.5	180	2
CA-CM-CN-N3	4	14.5	180	2
CN-CM-CN-CA	4	14.5	180	2
CN-CM-CN-N1	4	14.5	180	2
CN-CM-CN-N4	4	14.5	180	2
CN-CM-CN-N3	4	14.5	180	2
CN-CM-CN-N2	4	14.5	180	2
CA-CN-CN-CA	4	14.5	180	2
CA-CN-CN-N1	4	14.5	180	2
CA-CN-CN-N4	4	14.5	180	2
N1-CN-CN-N4	4	14.5	180	2
CA-CN-N1-CN	4	1.2	180	2
CA-CN-N2-CN	4	1.2	180	2
CA-CN-N3-CN	4	1.2	180	2
CA-CN-N4-CN	4	1.2	180	2
CA-CN-N1-Ga	4	1.2	180	2
CA-CN-N2-Ga	4	1.2	180	2
CA-CN-N3-Ga	4	1.2	180	2
CA-CN-N4-Ga	4	1.2	180	2
CM-CN-N1-CN	4	1.2	180	2
CM-CN-N2-CN	4	1.2	180	2
CM-CN-N3-CN	4	1.2	180	2
CM-CN-N4-CN	4	1.2	180	2
CM-CN-N1-Ga	4	1.2	180	2
CM-CN-N2-Ga	4	1.2	180	2
CM-CN-N3-Ga	4	1.2	180	2
CM-CN-N4-Ga	4	1.2	180	2
CN-CN-N1-CN	4	1.2	180	2
CN-CN-N4-CN	4	1.2	180	2
CN-CN-N1-Ga	4	1.2	180	2
CN-CN-N4-Ga	4	1.2	180	2
N1-Ga-N2-CN	4	0	180	2
N1-Ga-N3-CN	4	0	180	2
N1-Ga-N4-CN	4	0	180	2
N2-Ga-N1-CN	4	0	180	2
N2-Ga-N3-CN	4	0	180	2

N2-Ga-N4-CN	4	0	180	2
N3-Ga-N1-CN	4	0	180	2
N3-Ga-N2-CN	4	0	180	2
N3-Ga-N4-CN	4	0	180	2
N4-Ga-N1-CN	4	0	180	2
N4-Ga-N2-CN	4	0	180	2
N4-Ga-N3-CN	4	0	180	2
CA-CA-CA-F	1	3.63	180	2
CA-CA-CA-HA	1	3.63	180	2
CA-CA-CA-X	1	3.63	180	2
CA-CA-CA-O	1	3.63	180	2
F -CA-CA-F	1	3.63	180	2
F -CA-CA-HA	1	3.63	180	2
F -CA-CA-X	1	3.63	180	2
F -CA-CA-O	1	3.63	180	2
Ga-CA-CM-CN	1	2.55	180	2
HA-CA-CM-CN	1	2.55	180	2
F -CA-CN-CM	1	3.63	180	2
F -CA-CN-HA	1	3.63	180	2
O -CA-CN-CM	1	3.63	180	2
O -CA-CN-F	1	3.63	180	2
S -CA-CN-CM	1	3.63	180	2
S -CA-CN-F	1	3.63	180	2
CA-CM-CN-CA	4	1.45	180	2
CN-CM-CN-CA	4	1.45	180	2

Table. S6 Summary of the AMBER parameters for improper torsions.

Atom types	**V(kcal.mol^{-1}rad^{-1})**	**Phase(deg.)**	**Period**

CA-CA-CA-CM	1.1	180	2
CA-CA-CA-F	1.1	180	2
CA-CN-CA-S	1.1	180	2
CA-CN-CM-CN	1.1	180	2
CA-CM-CN-N1	1.1	180	2
CA-CM-CN-N2	1.1	180	2
CA-CM-CN-N3	1.1	180	2
CA-CM-CN-N4	1.1	180	2
CA-CN-CN-N1	1.1	180	2
CA-CN-CN-N2	1.1	180	2
CA-CN-CN-N3	1.1	180	2
CA-CN-CN-N4	1.1	180	2
CN-CN-N1-Ga	1.1	180	2
CN-CN-N2-Ga	1.1	180	2
CN-CN-N3-Ga	1.1	180	2
CN-CN-N4-Ga	1.1	180	2
N1-N2-Ga-N3	1.1	180	2
N1-N2-Ga-N4	1.1	180	2
N1-N3-Ga-N4	1.1	180	2
N2-N3-Ga-N4	1.1	180	2
CA-HA-CA-X	1.1	180	2
CM-Ga-CA-HA	1.1	180	2
CA-CN-CM-CN	1.1	180	2