

Supporting Information

Isobutylhydroxyamides from Sichuan Pepper and Their Protective Activity on PC12 Cells Damaged by Corticosterone

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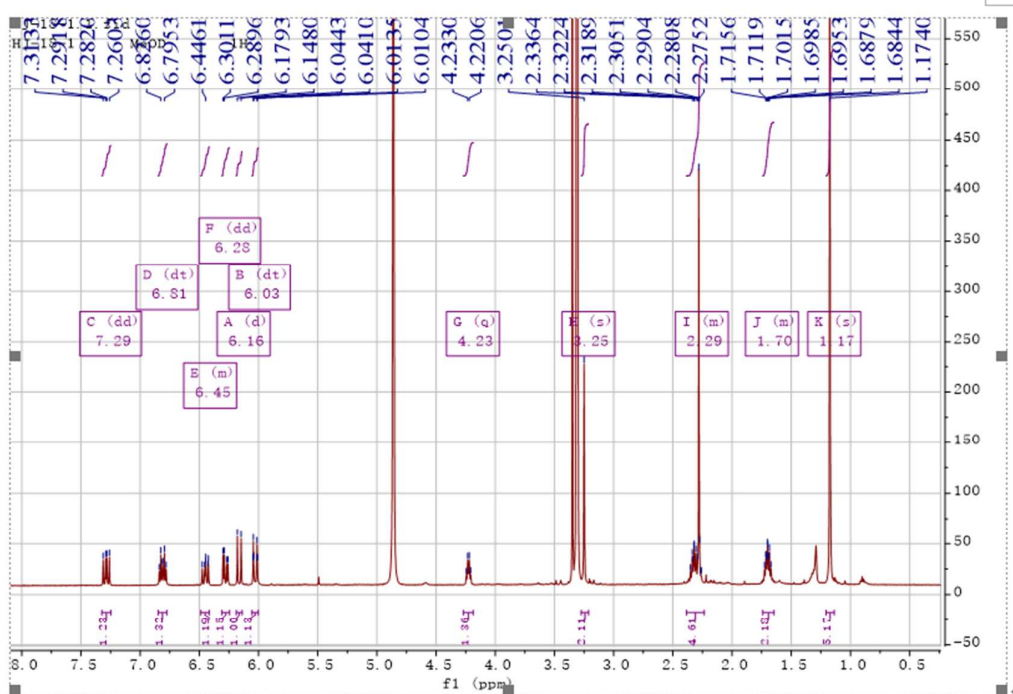


Fig. S1.1 ¹H NMR spectrum (500 MHz) of (-)-ZP-amide A (**1a**) in CD₃OD

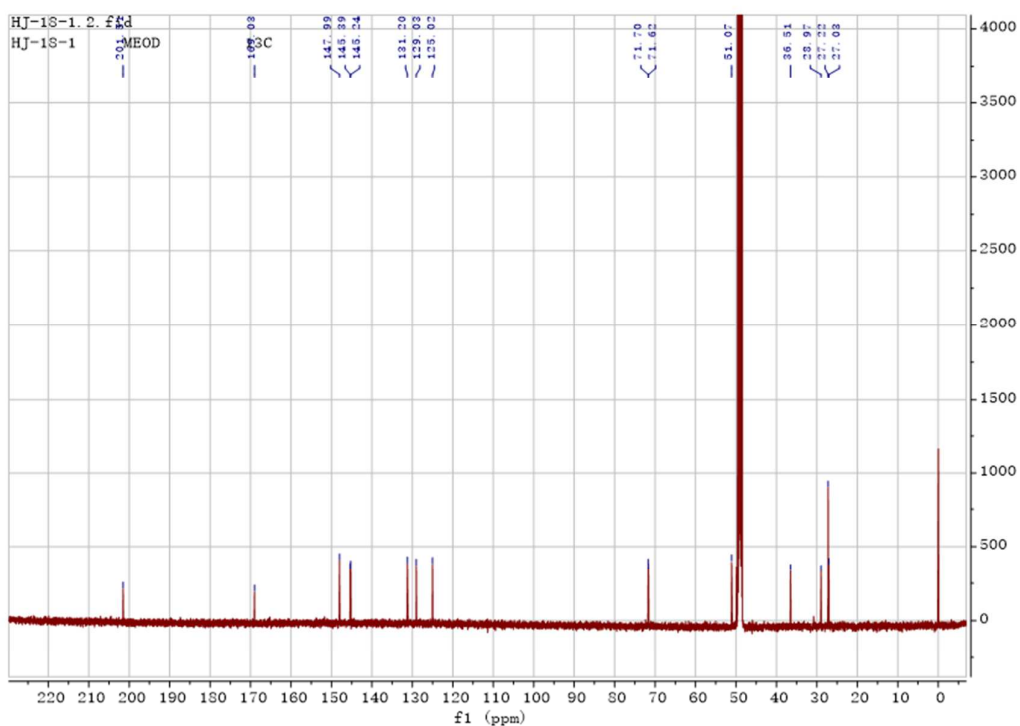


Fig. S1.2 ¹³C NMR spectrum (125 MHz) of (-)-ZP-amide A (**1a**) in CD₃OD

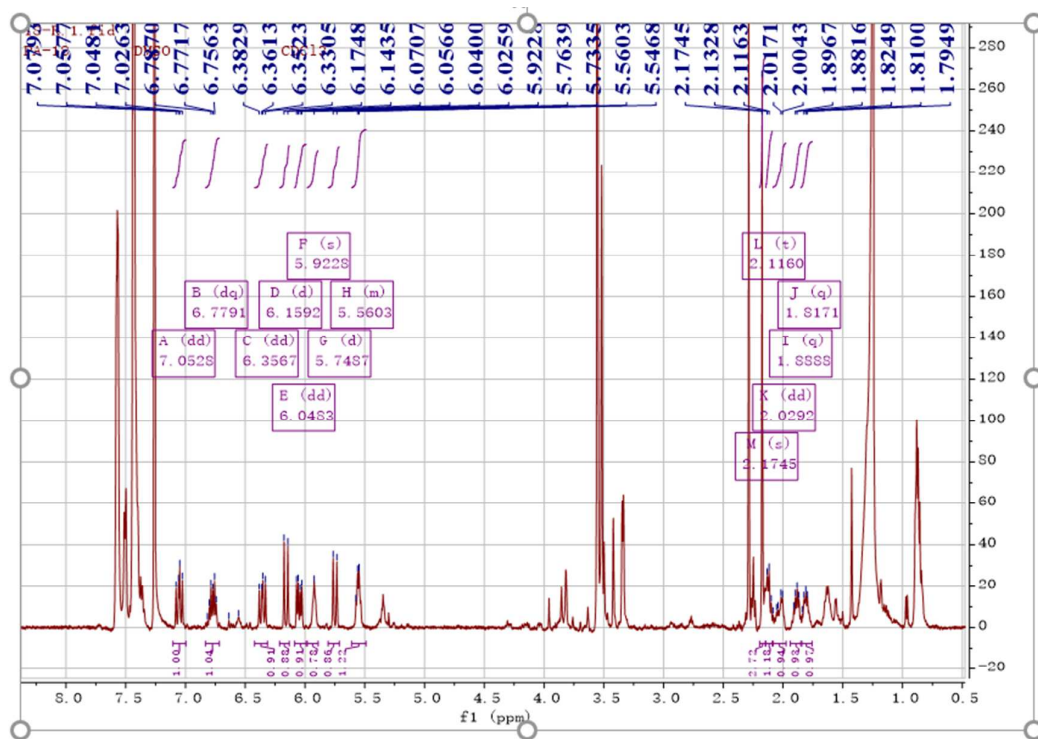


Fig. S1.3 ¹H NMR spectrum (500 MHz) of (*R*)-MTPA ester of **1a** in Chloroform-*d*

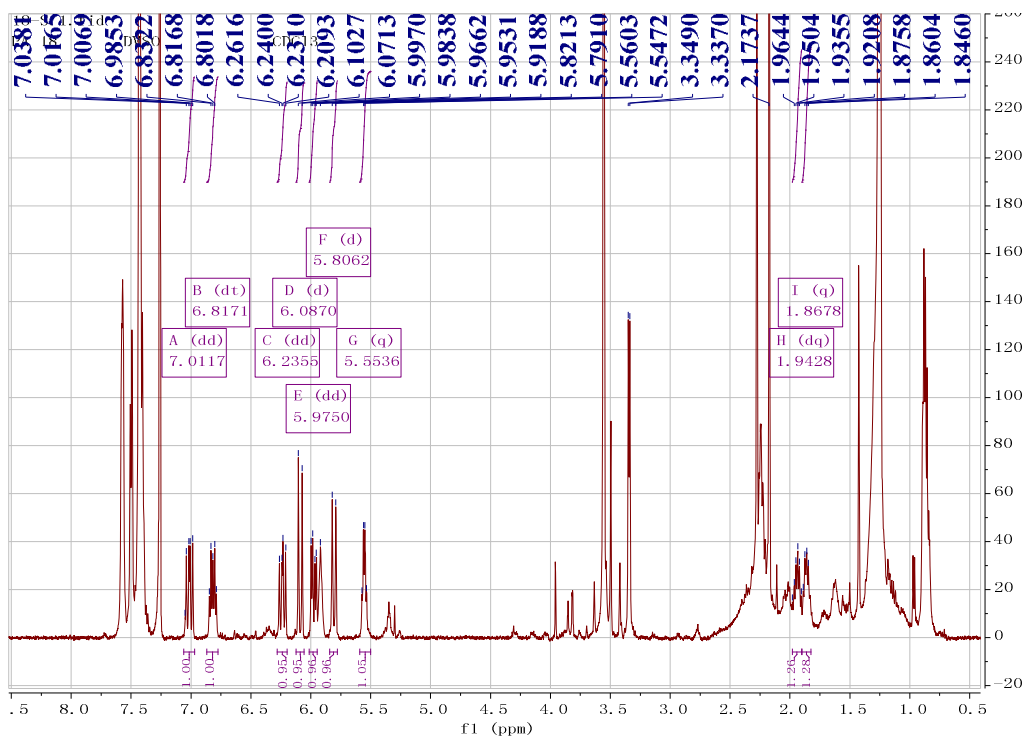


Fig. S1.4 ¹H NMR spectrum (500 MHz) of (*S*)-MTPA ester of **1a** in Chloroform-*d*

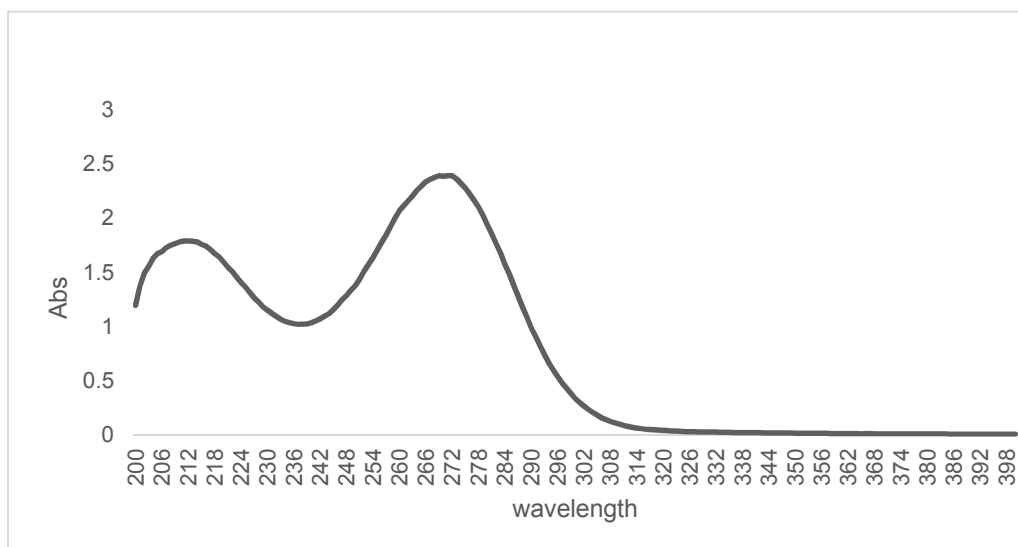


Fig. S1.5 UV spectrum of (-)-ZP-amide A (**1a**)

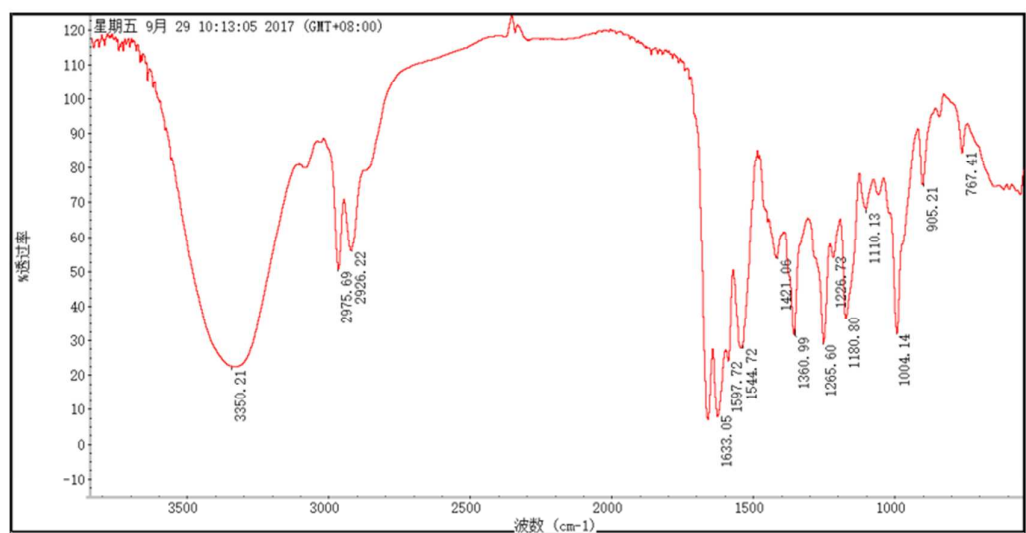


Fig. S1.6 IR spectrum of (-)-ZP-amide A (**1a**)

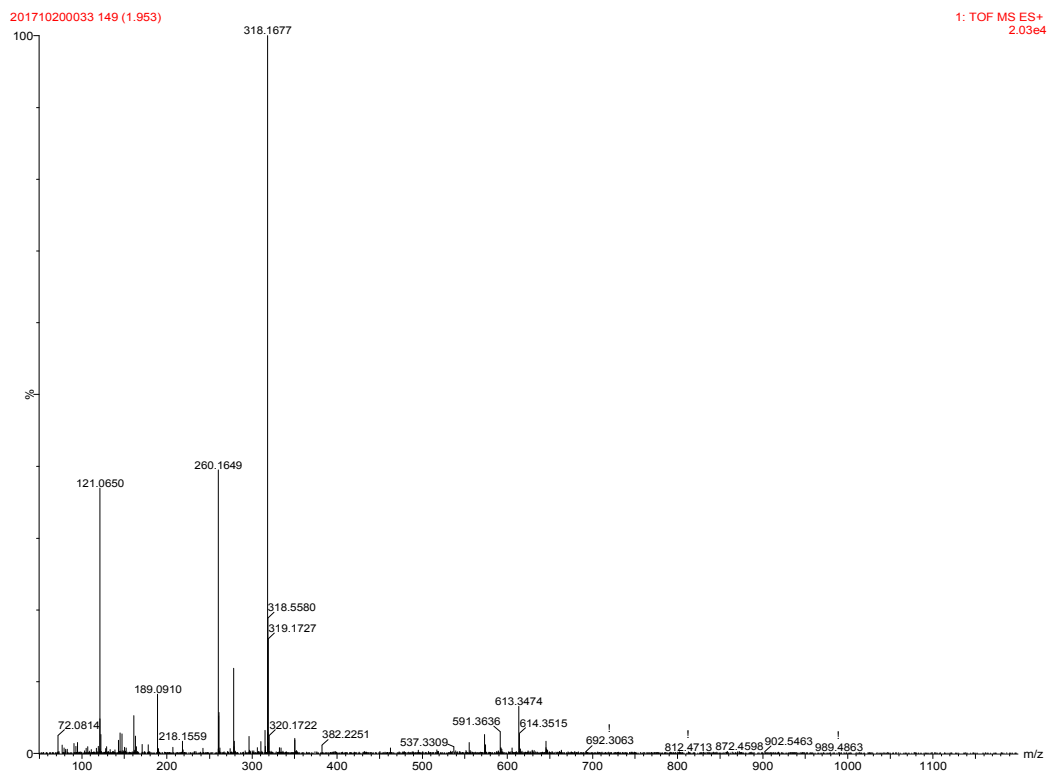


Fig. S1.7 HRESIMS spectrum of (–)-ZP-amide A (**1a**)

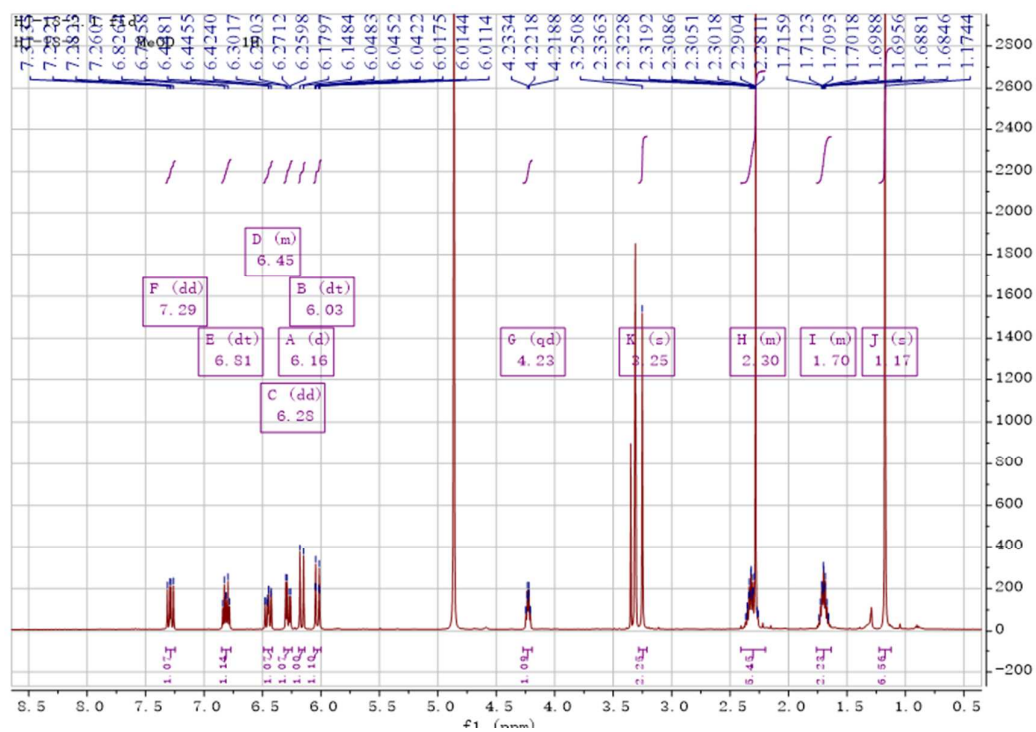


Fig. S2.1 ¹H NMR spectrum (500 MHz) of (+)-ZP-amide A (**1b**) in CD₃OD

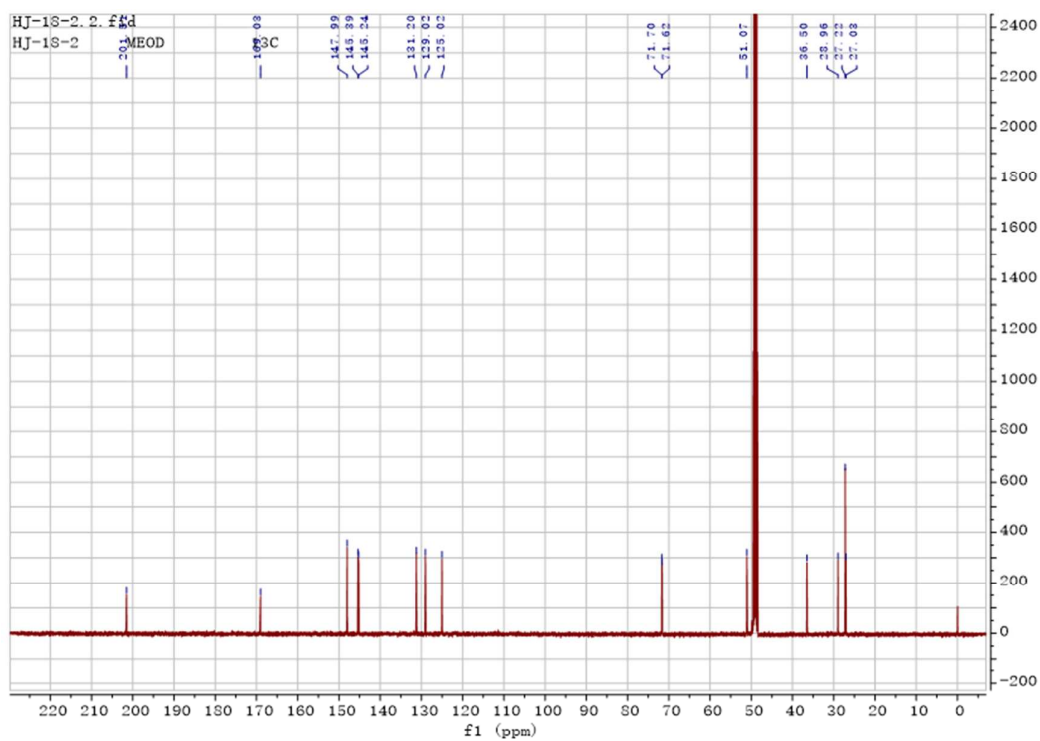


Fig. S2.2 ¹³C NMR spectrum (125 MHz) of (+)-ZP-amide A (**1b**) in CD₃OD

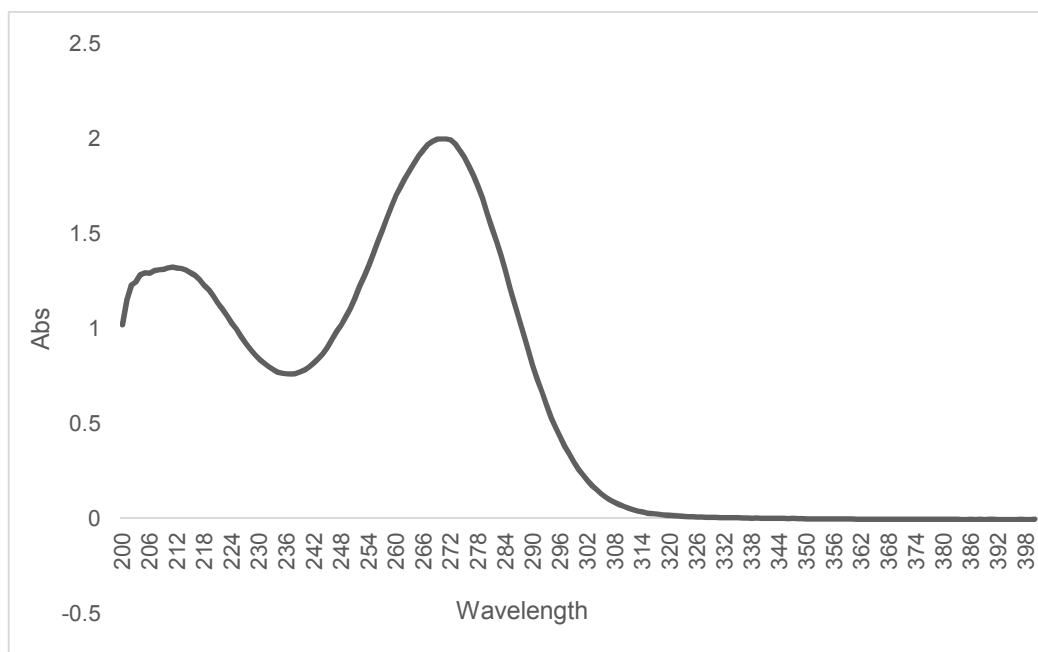


Fig. S2.3 UV spectrum of (+)-ZP-amide A (**1b**)

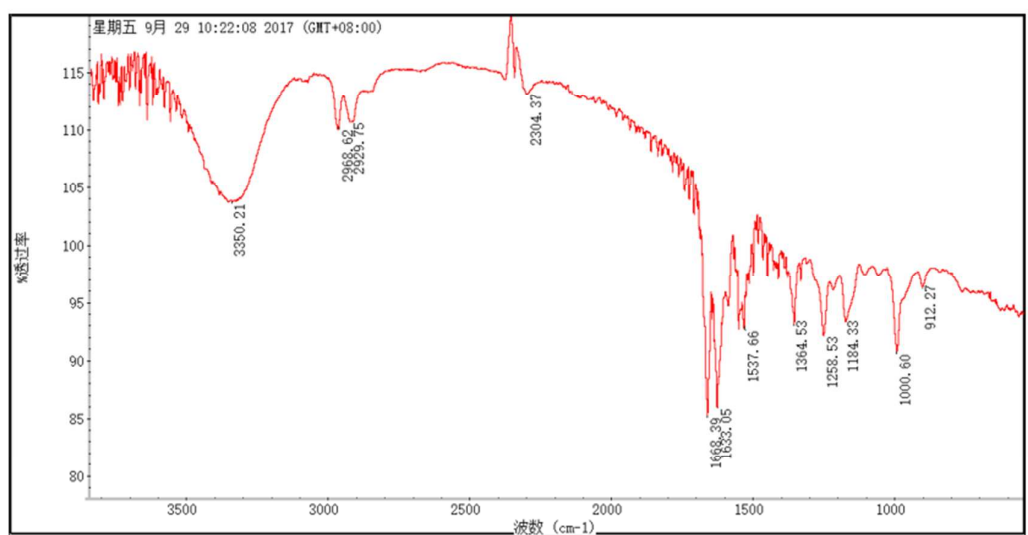


Fig. S2.4 IR spectrum of (+)-ZP-amide A (**1b**)

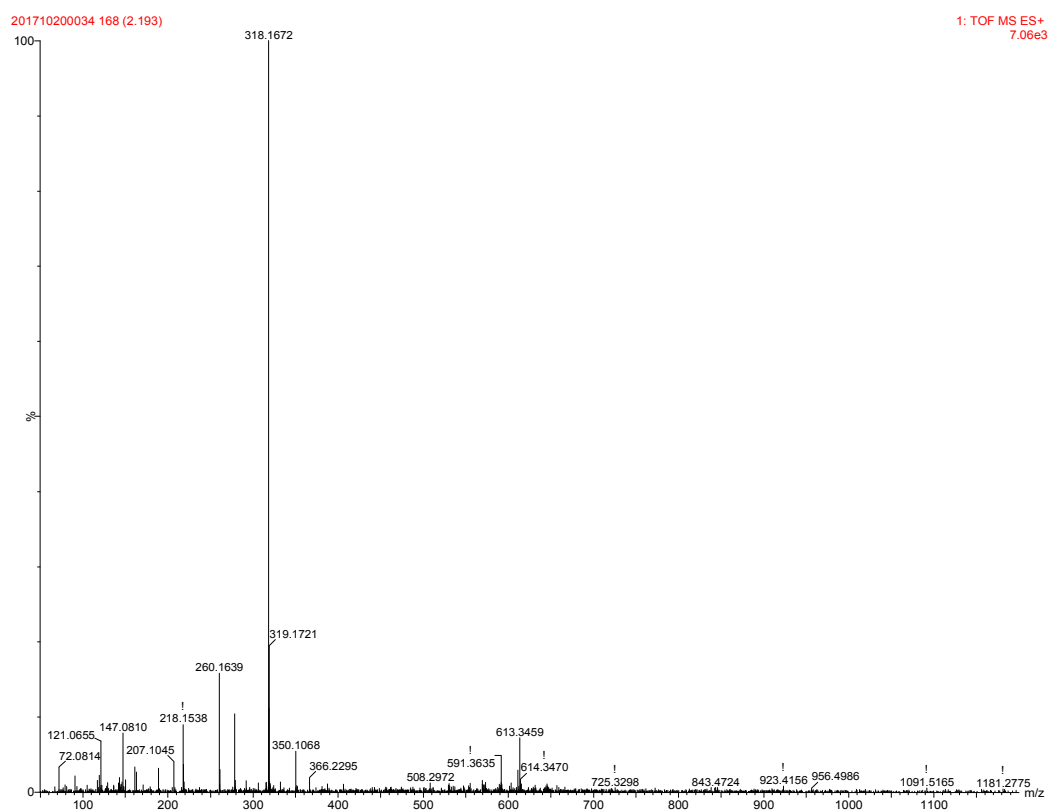


Fig. S2.5 HRMSIMS spectrum of (+)-ZP-amide A (**1b**)

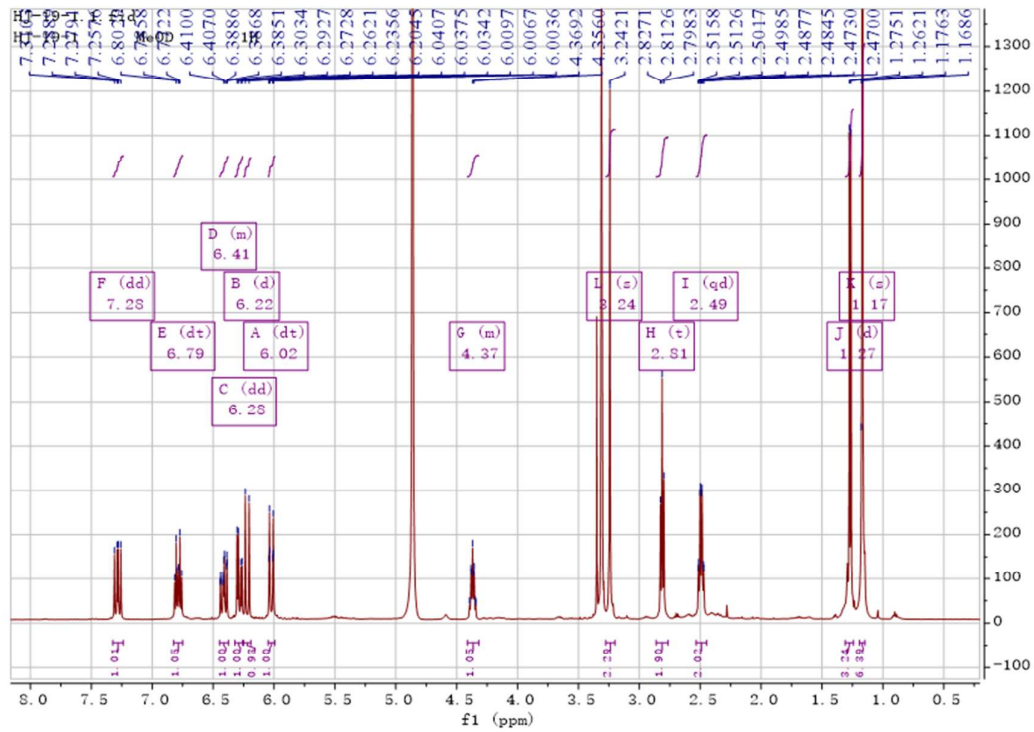


Fig. S3.1 ¹H NMR spectrum (500 MHz) of (-)-ZP-amide B (**2a**) in CD₃OD

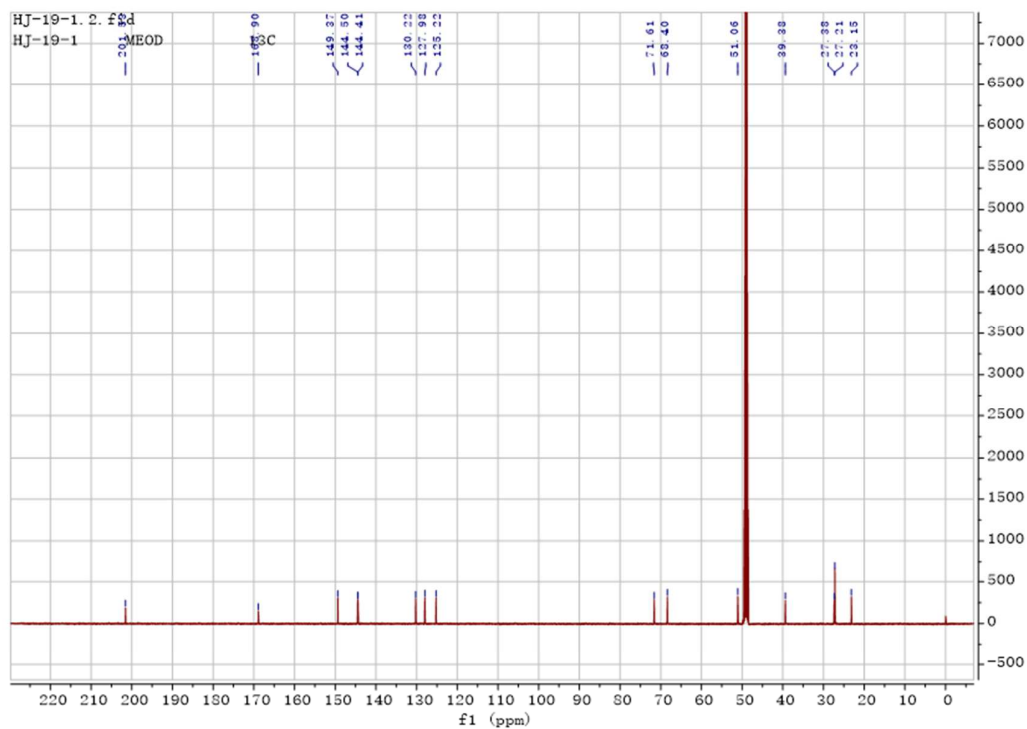


Fig. S3.2 ¹³C NMR spectrum (125 MHz) of (-)-ZP-amide B (**2a**) in CD₃OD

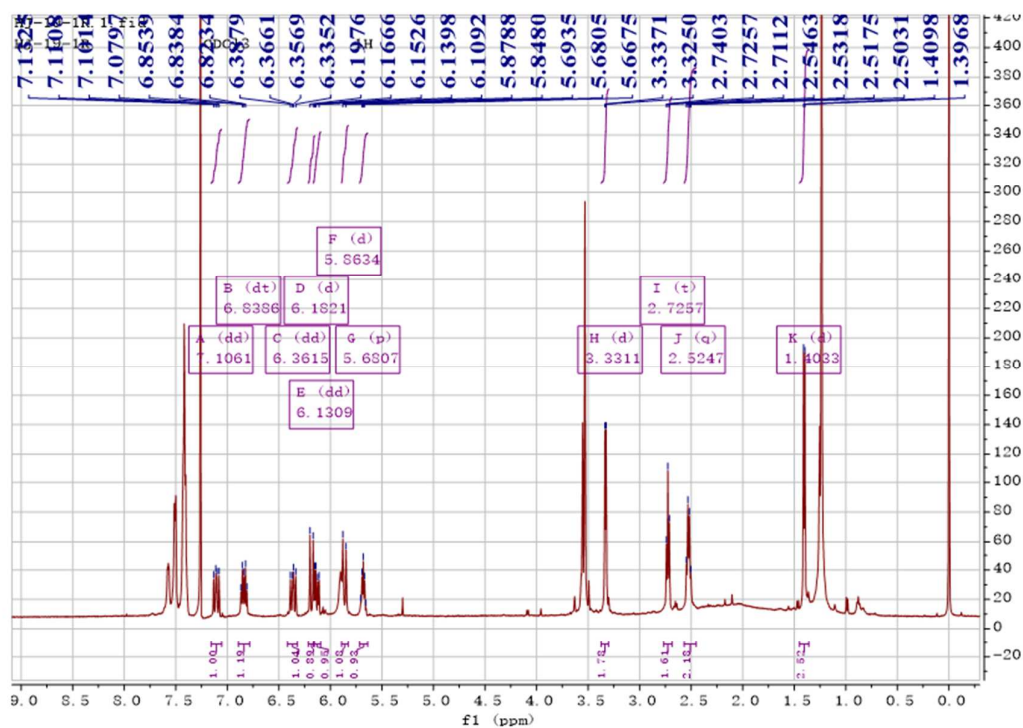


Fig. S3.3 ^1H NMR spectrum (500 MHz) of (*R*)-MTPA ester of **2a** in Chloroform-*d*

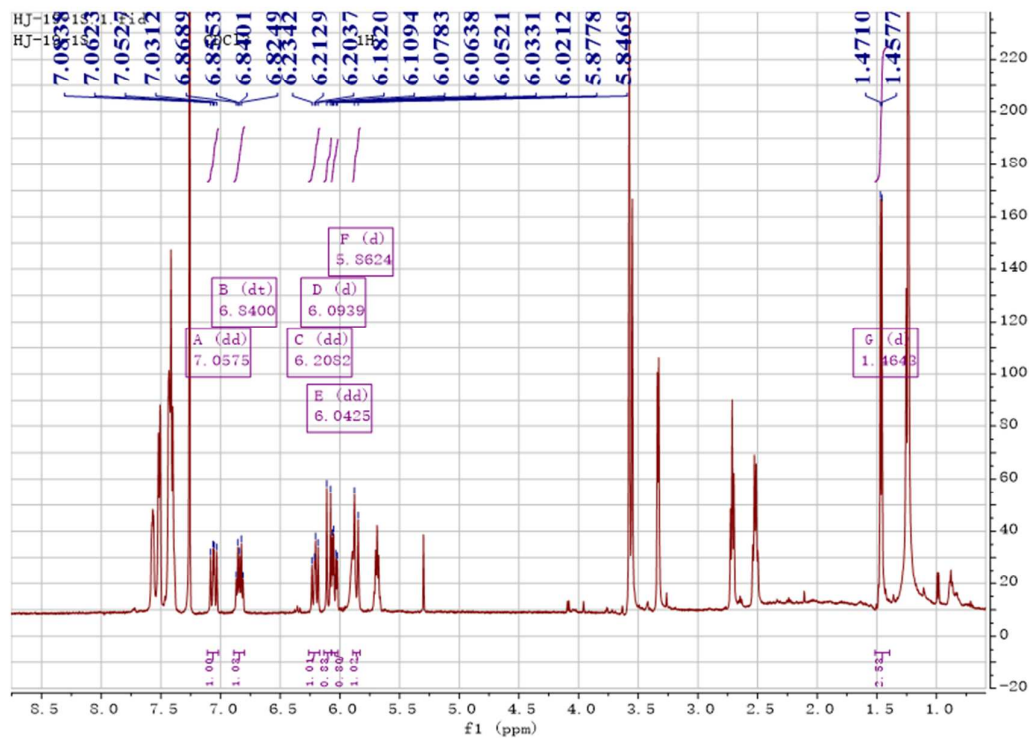


Fig. S3.4 ^1H NMR spectrum (500 MHz) of (*S*)-MTPA ester of **2a** in Chloroform-*d*

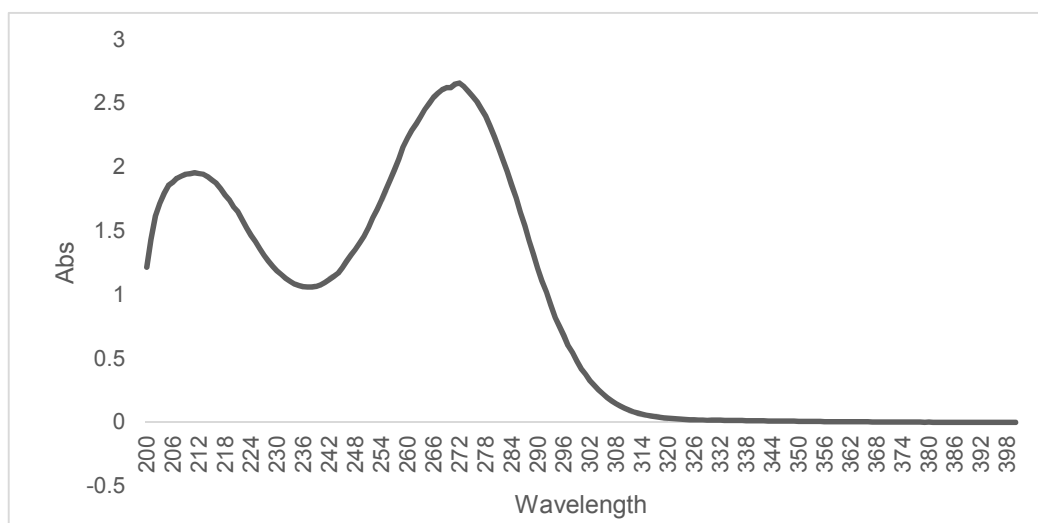


Fig. S3.5 UV spectrum of (-)-ZP-amide B (**2a**)

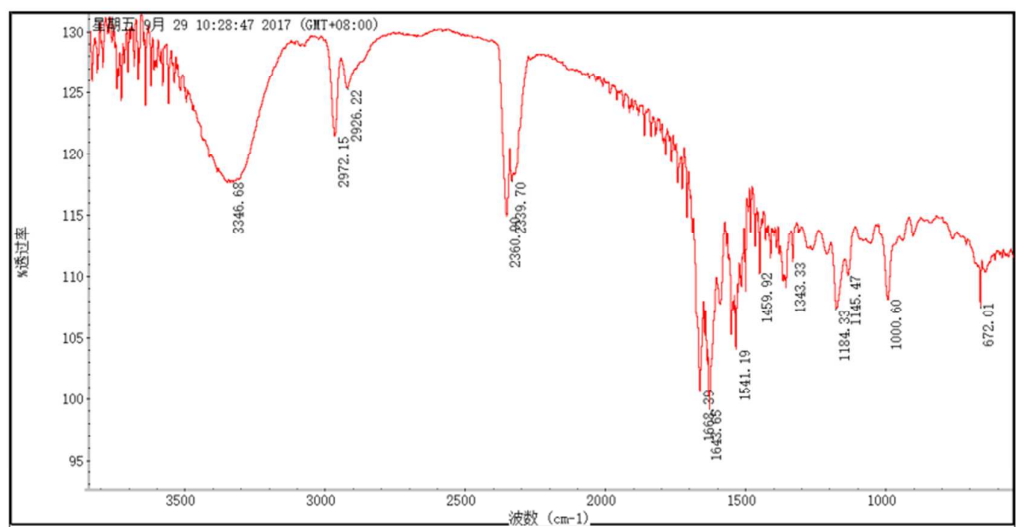


Fig. S3.6 IR spectrum of (-)-ZP-amide B (**2a**)

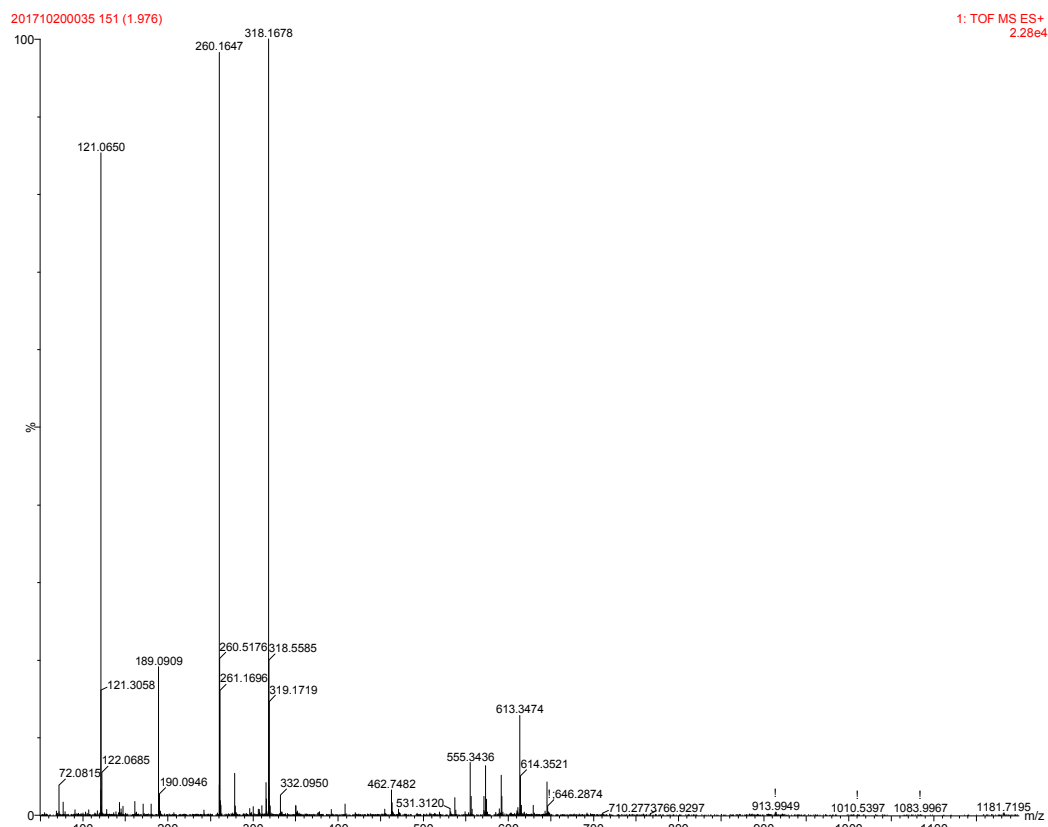


Fig. S3.7 HRESIMS spectrum of (-)-ZP-amide B (**2a**)

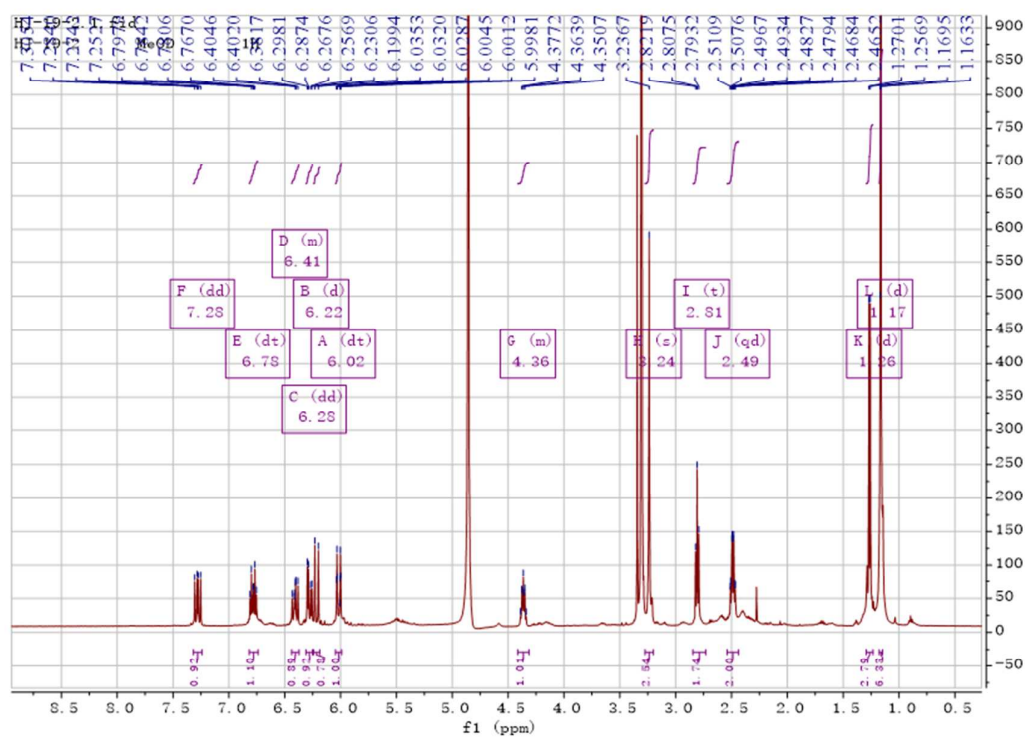


Fig. S4.1 ¹H NMR spectrum (500 MHz) of (+)-ZP-amide B (**2b**) in CD₃OD

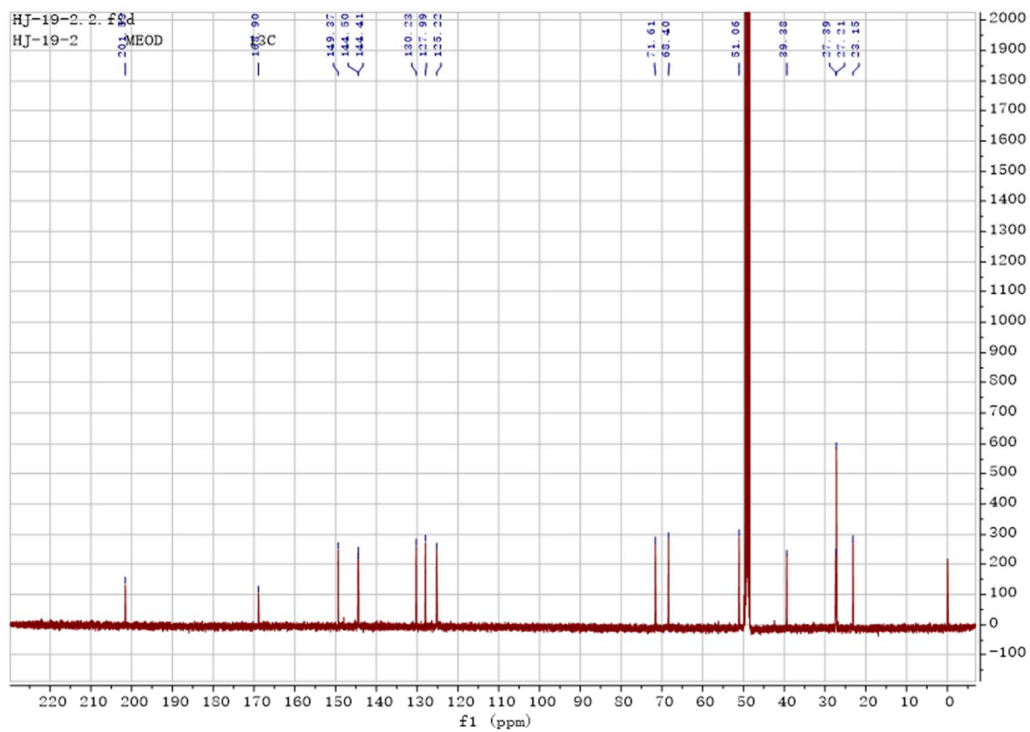


Fig. S4.2 ¹³C NMR spectrum (125 MHz) of (+)-ZP-amide B (**2b**) in CD₃OD

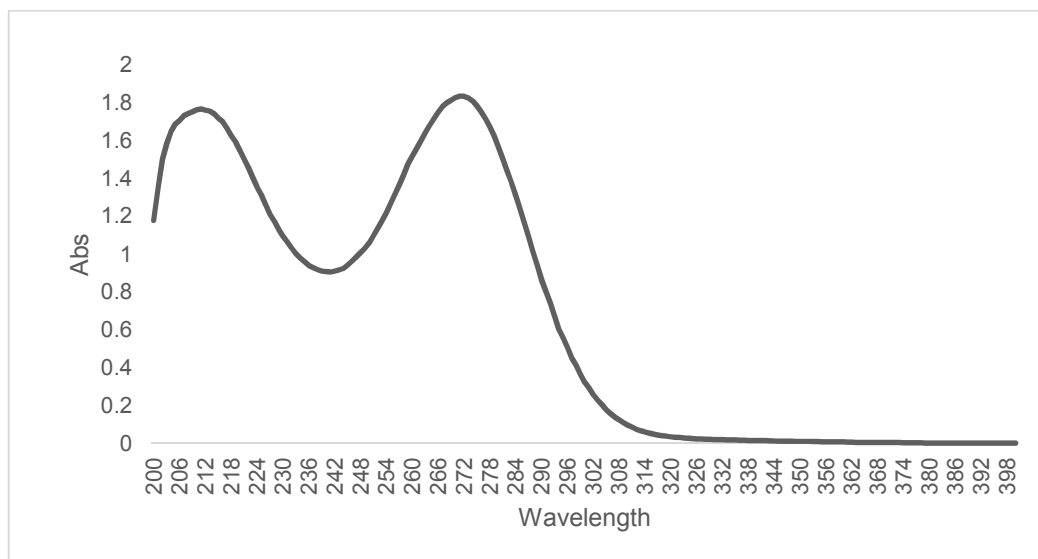


Fig. S4.3 UV spectrum of (+)-ZP-amide B (**2b**)

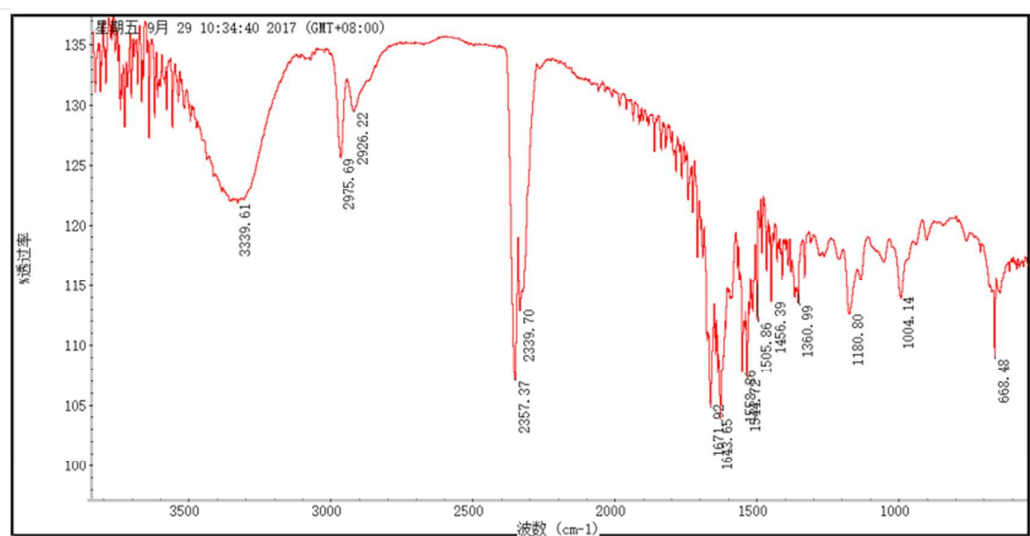


Fig. S4.4 IR spectrum of (+)-ZP-amide B (**2b**)

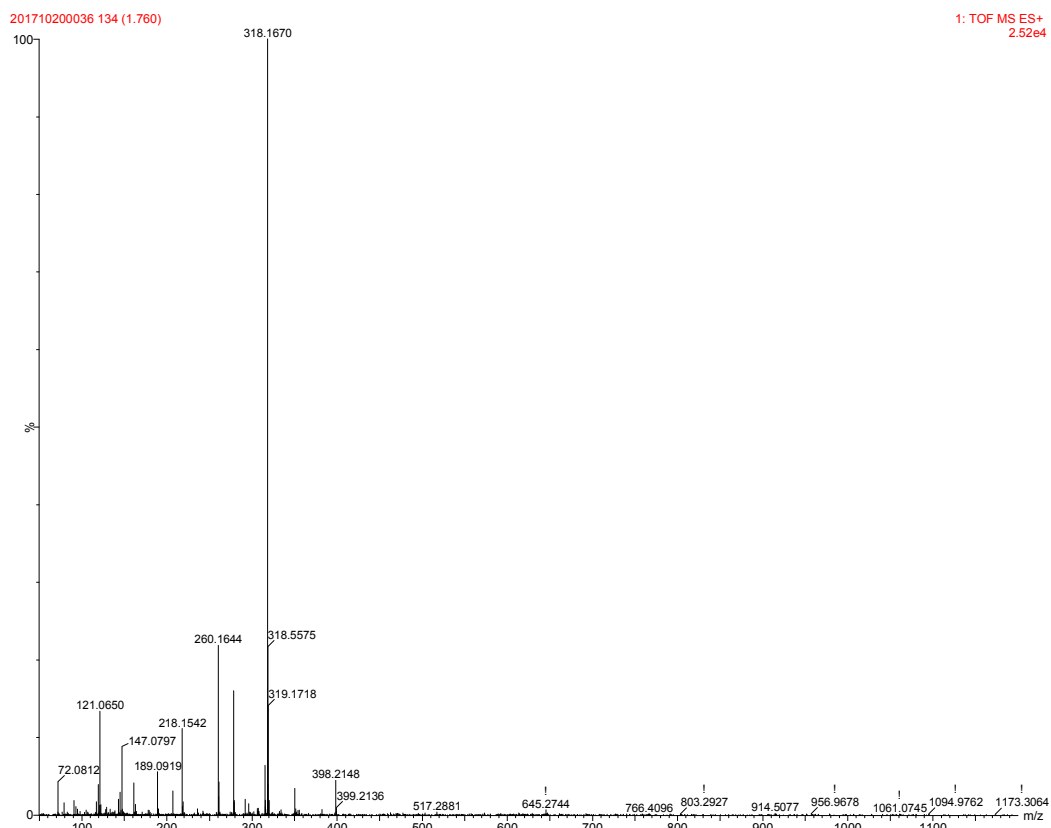


Fig. S4.5 HRESIMS spectrum of (+)-ZP-amide B (**2b**)

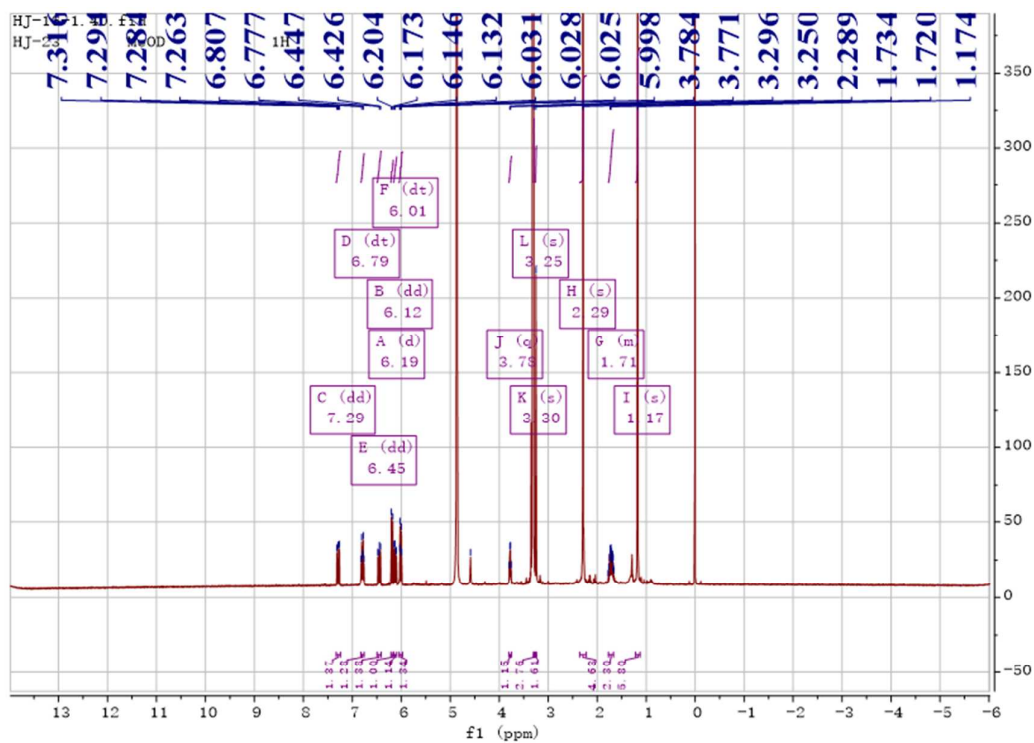


Fig. S5.1 ^1H NMR spectrum (500 MHz) of ($\pm$)-ZP-amide G (**3**) in CD_3OD

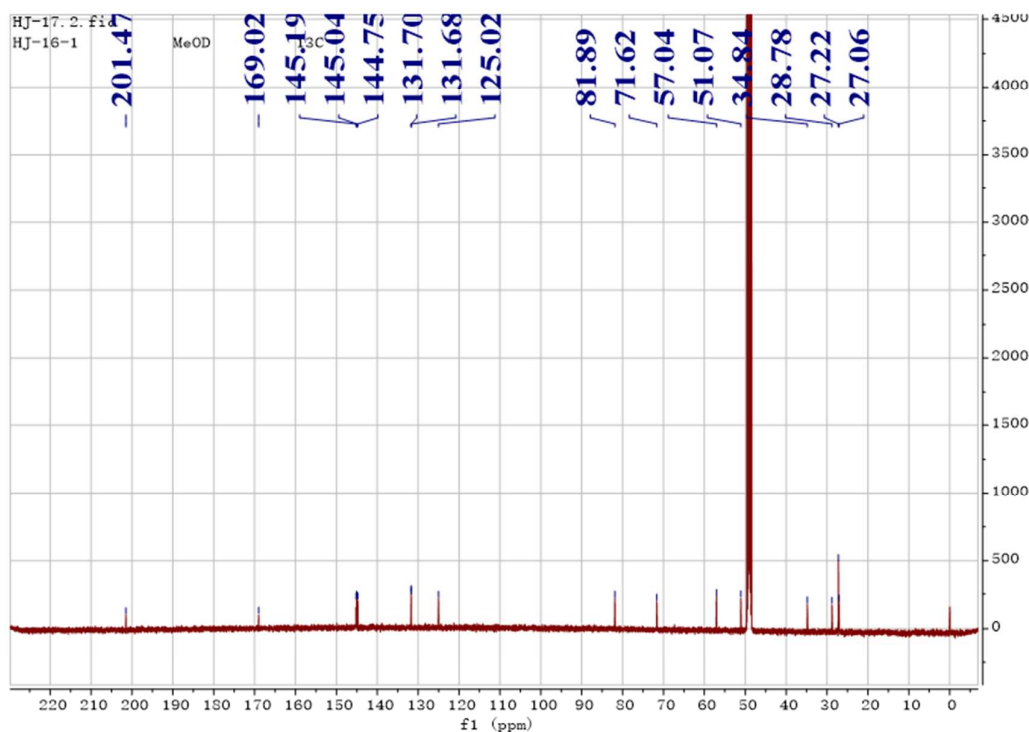


Fig. S5.2 ^{13}C NMR spectrum (125 MHz) of ($\pm$)-ZP-amide G (**3**) in CD_3OD

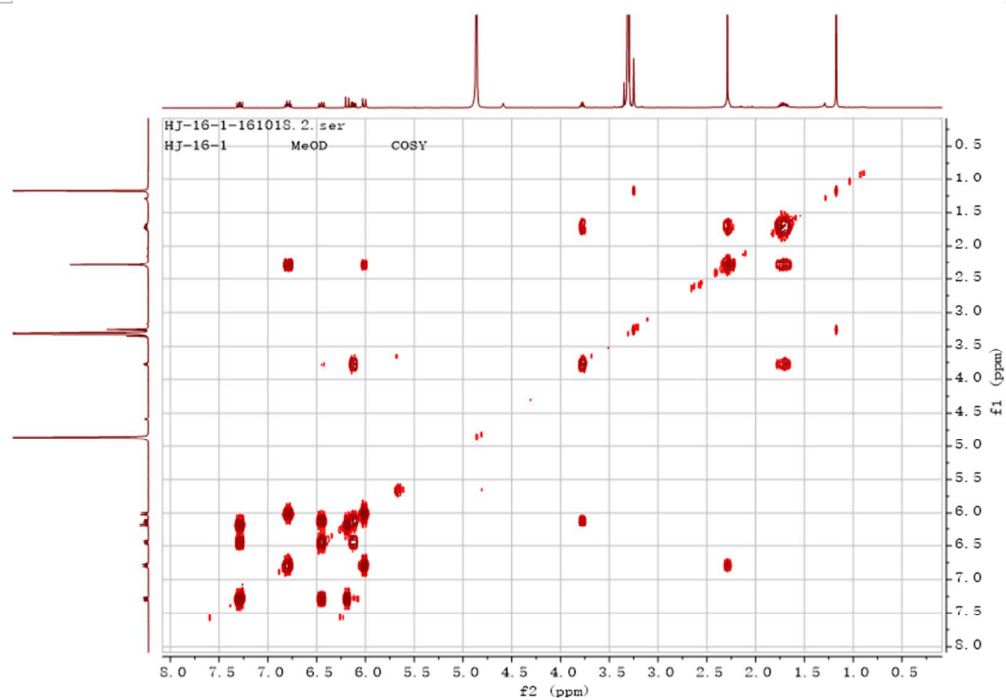


Fig. S5.3 ^1H - ^1H COSY spectrum (500 MHz) of $(\pm)$ -ZP-amide **G** (**3**) in CD_3OD

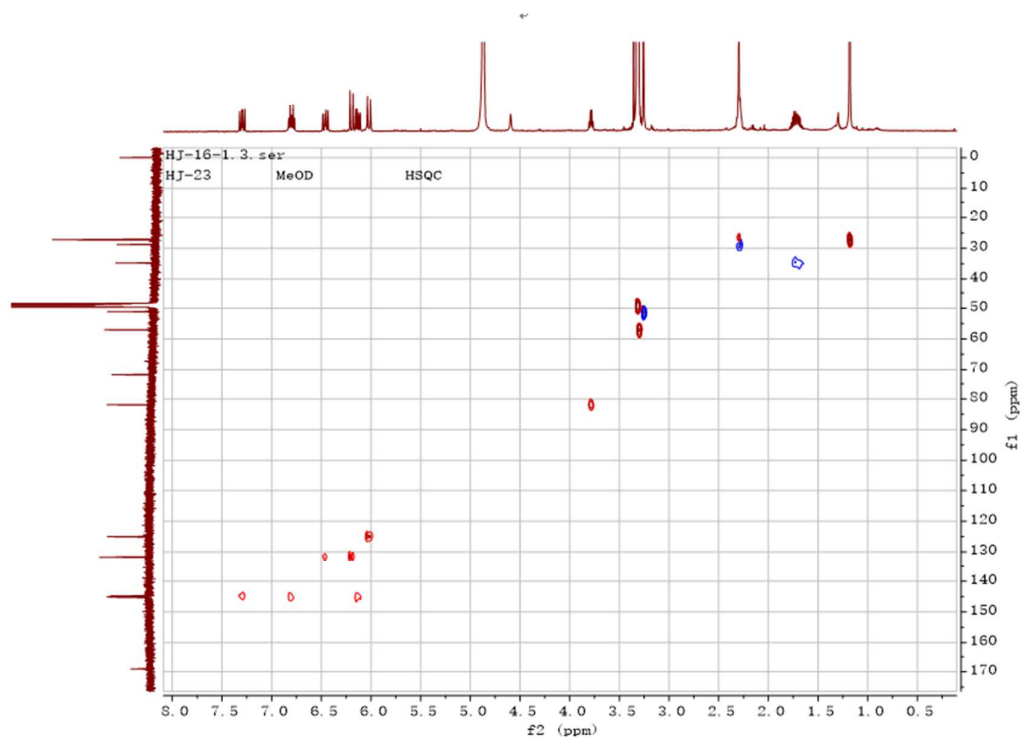


Fig. S5.4 HSQC spectrum (500 MHz) of $(\pm)$ -ZP-amide **G** (**3**) in CD_3OD

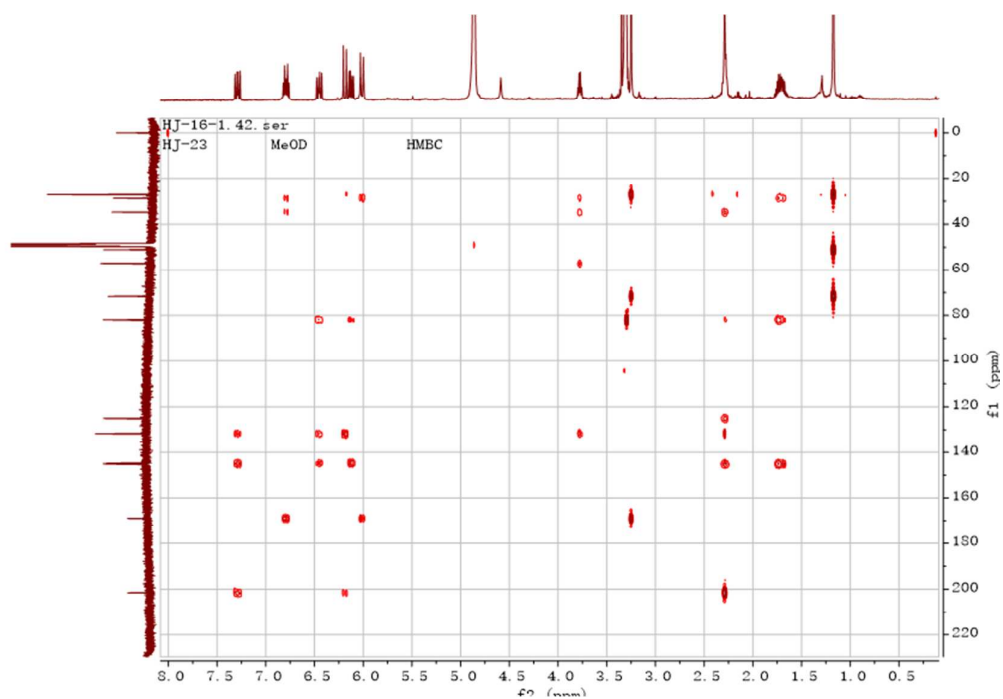
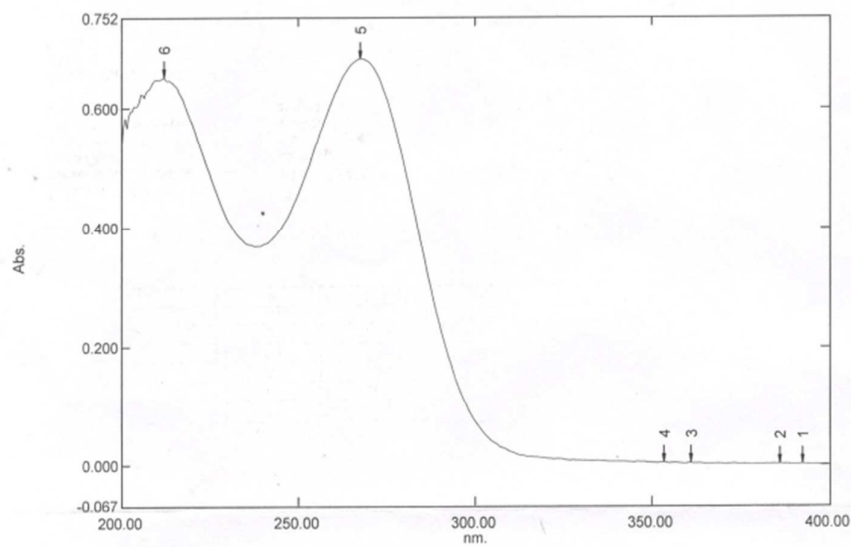


Fig. S5.5 HMBC spectrum (500 MHz) of (±)-ZP-amide G (3) in CD₃OD

Data Set: Storage 162757 - RawData - D:\2015\HJ-16-1.spc



No.	P/V	Wavelength	Abs.	Description
1	⊕	392.50	0.002	
2	⊕	386.00	0.003	
3	⊕	361.00	0.004	
4	⊕	353.50	0.005	
5	⊕	267.50	0.683	
6	⊕	212.00	0.652	

Fig. S5.6 UV spectrum of (±)-ZP-amide G (3)

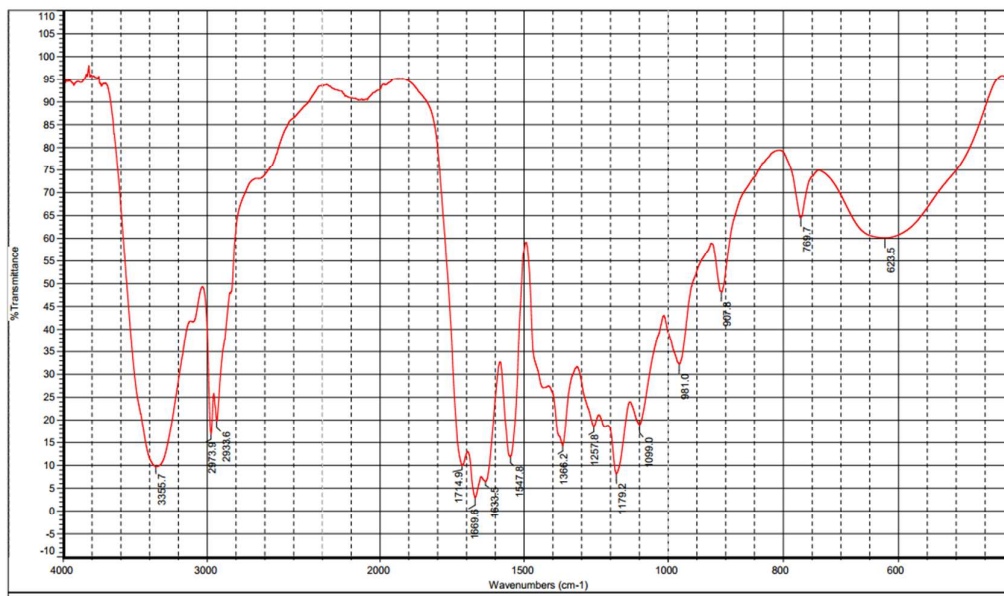


Fig. S5.7 IR spectrum of (±)-ZP-amide G (3)

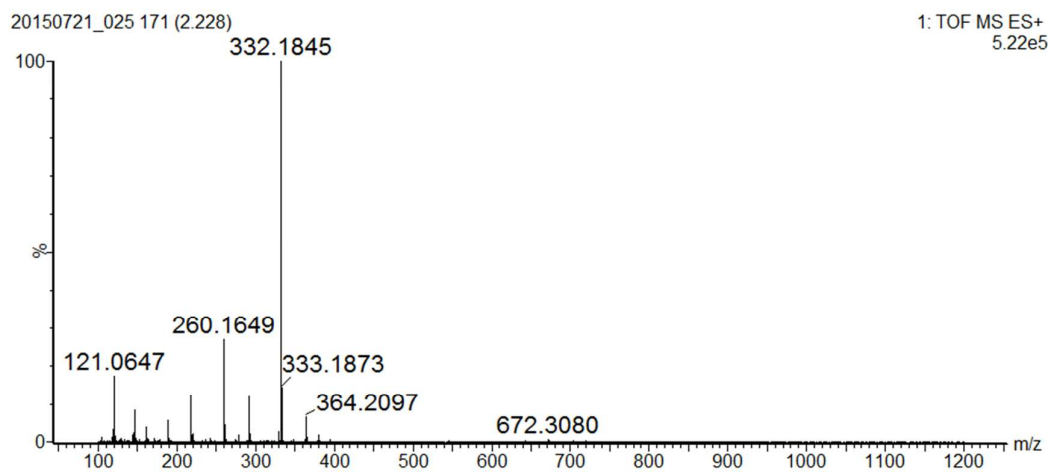


Fig. S5.8 HRESIMS spectrum of (±)-ZP-amide G (3)



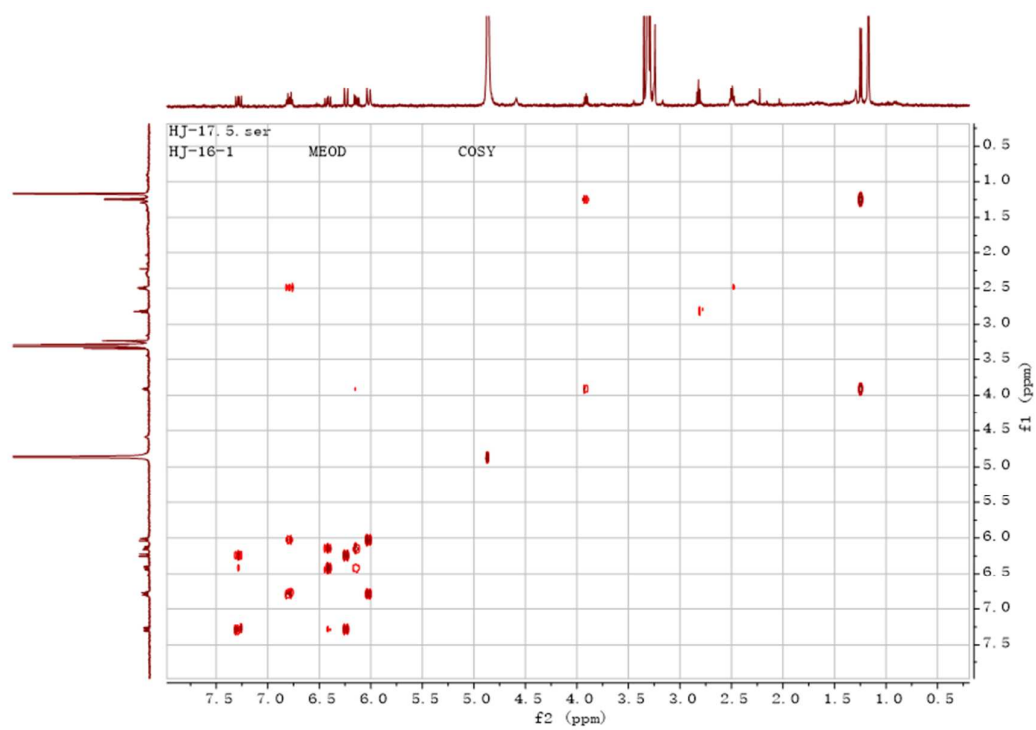


Fig. S6.3 ^1H - ^1H COSY spectrum (500 MHz) of ($\pm$)-ZP-amide H (**4**) in CD_3OD

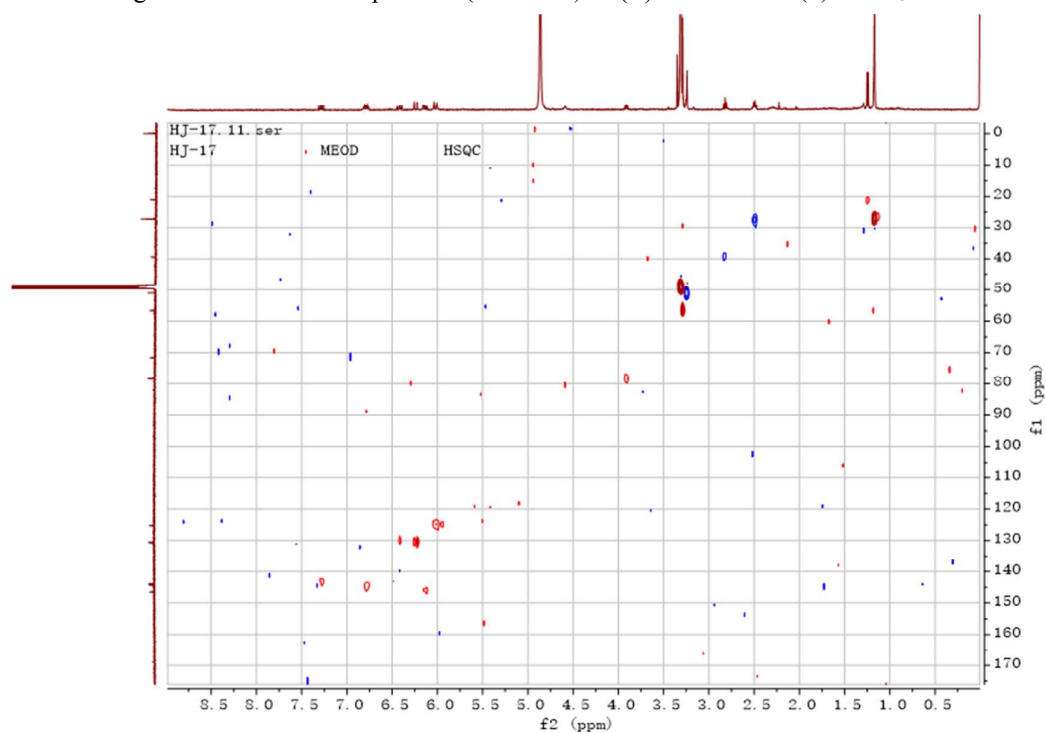


Fig. S6.4 HSQC spectrum (500 MHz) of ($\pm$)-ZP-amide H (**4**) in CD_3OD

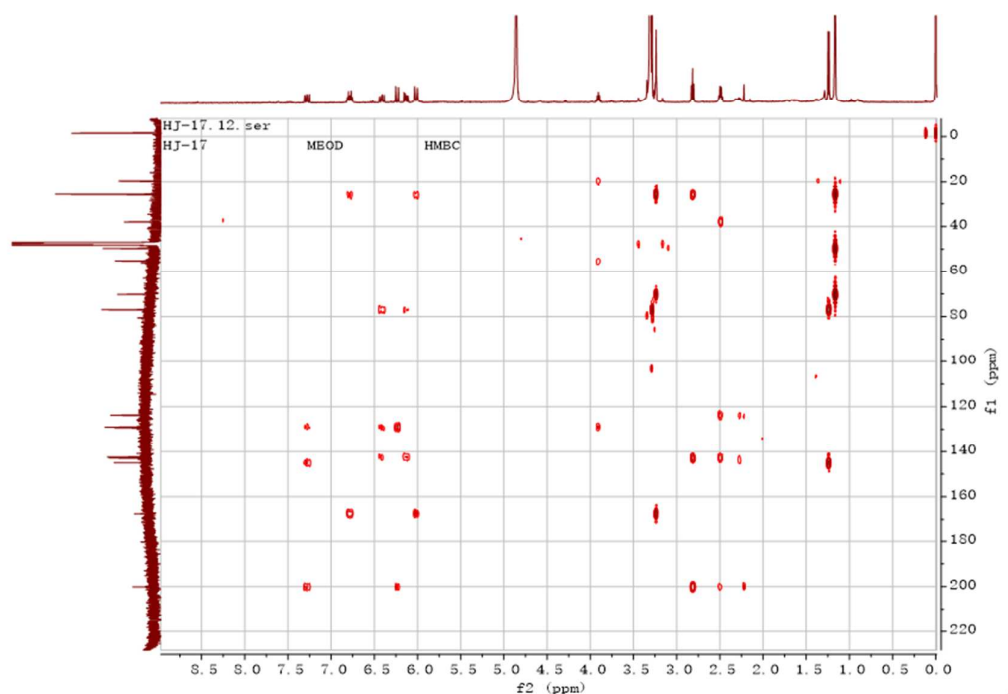
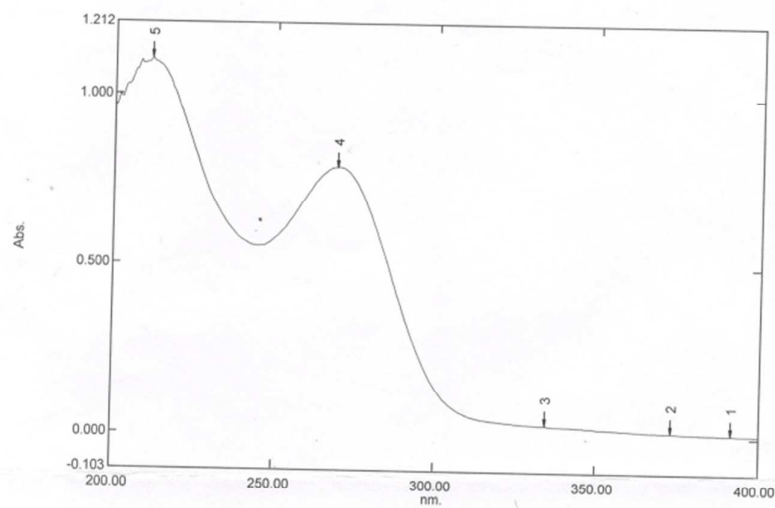


Fig. S6.5 HMBC spectrum (500 MHz) of (±)-ZP-amide H (4) in CD₃OD

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Data Set: Storage 162026 - RawData - D:\2015\HJ-17-1.spc



No.	P/V	Wavelength	Abs.	Description
1	⊕	391.50	0.009	
2	⊕	373.00	0.012	
3	⊕	334.50	0.029	
4	⊕	269.00	0.786	
5	⊕	211.50	1.103	

Fig. S6.6 UV spectrum of (±)-ZP-amide H (4)

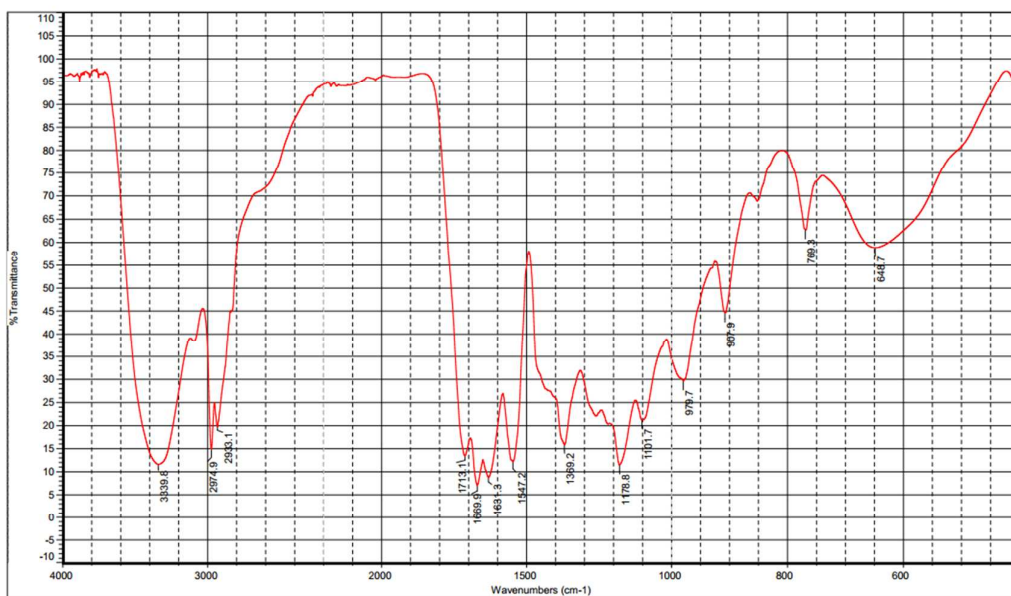


Fig. S6.7 IR spectrum of (±)-ZP-amide H (4)

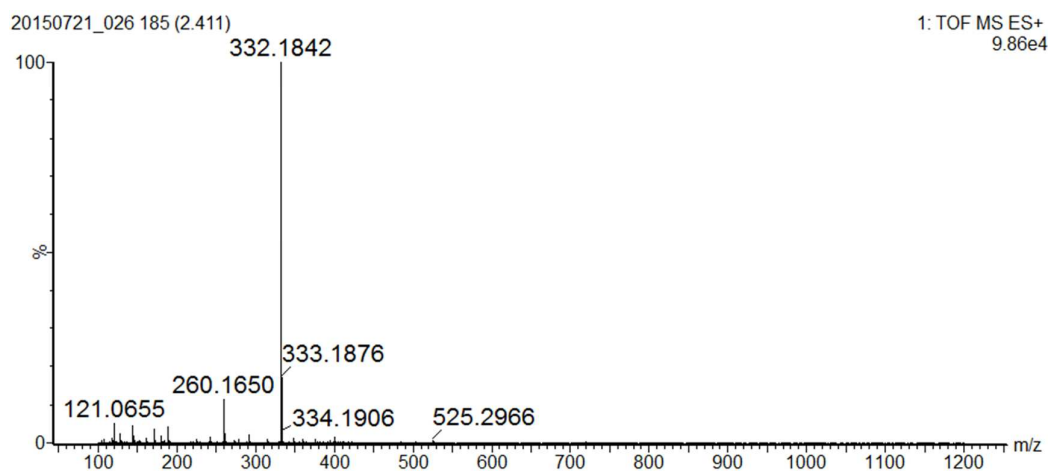


Fig. S6.8 HRESIMS spectrum of (±)-ZP-amide H (4)

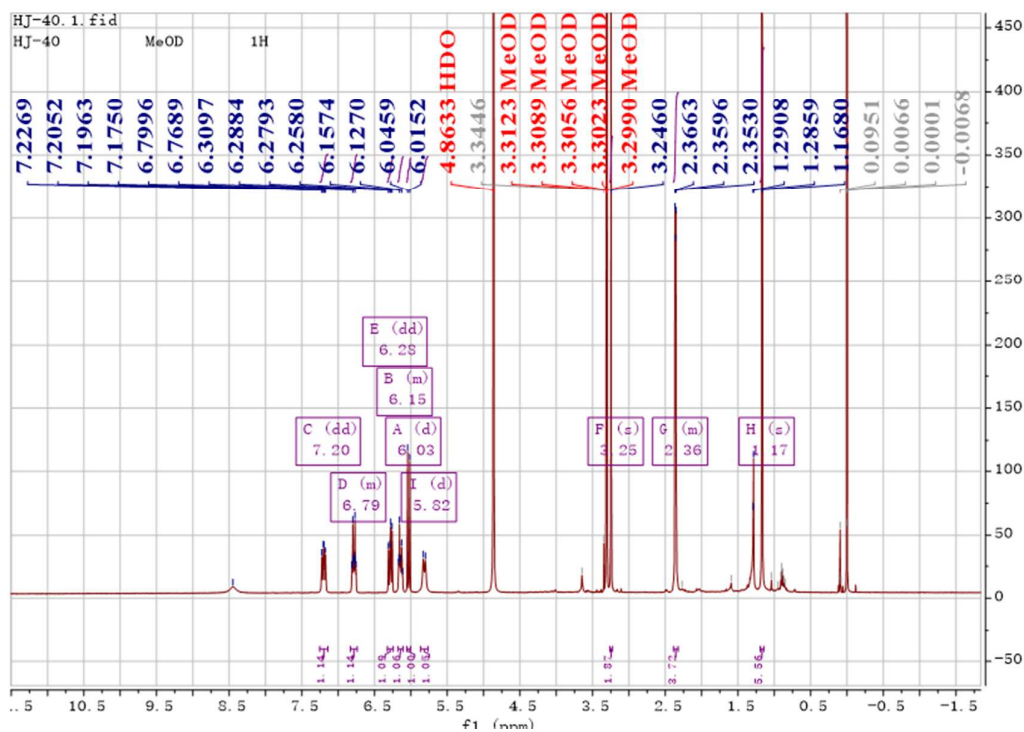


Fig. S7.1 ¹H NMR spectrum (500 MHz) of ZP-amide I (5) in CD₃OD

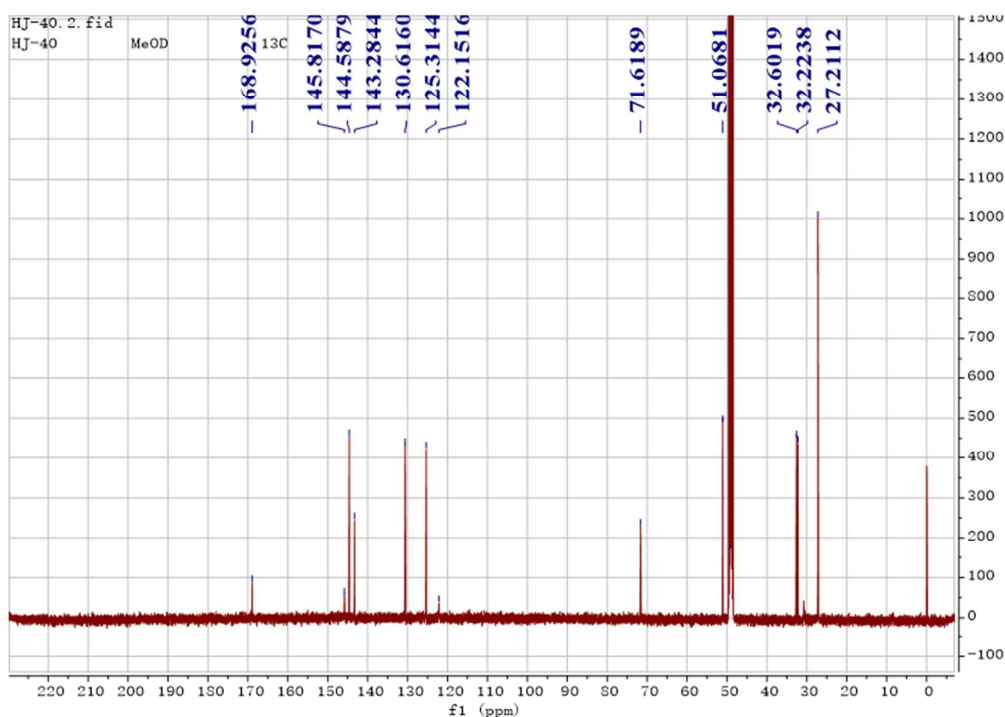


Fig. S7.2 ¹³C NMR spectrum (125 MHz) of ZP-amide I (5) in CD₃OD

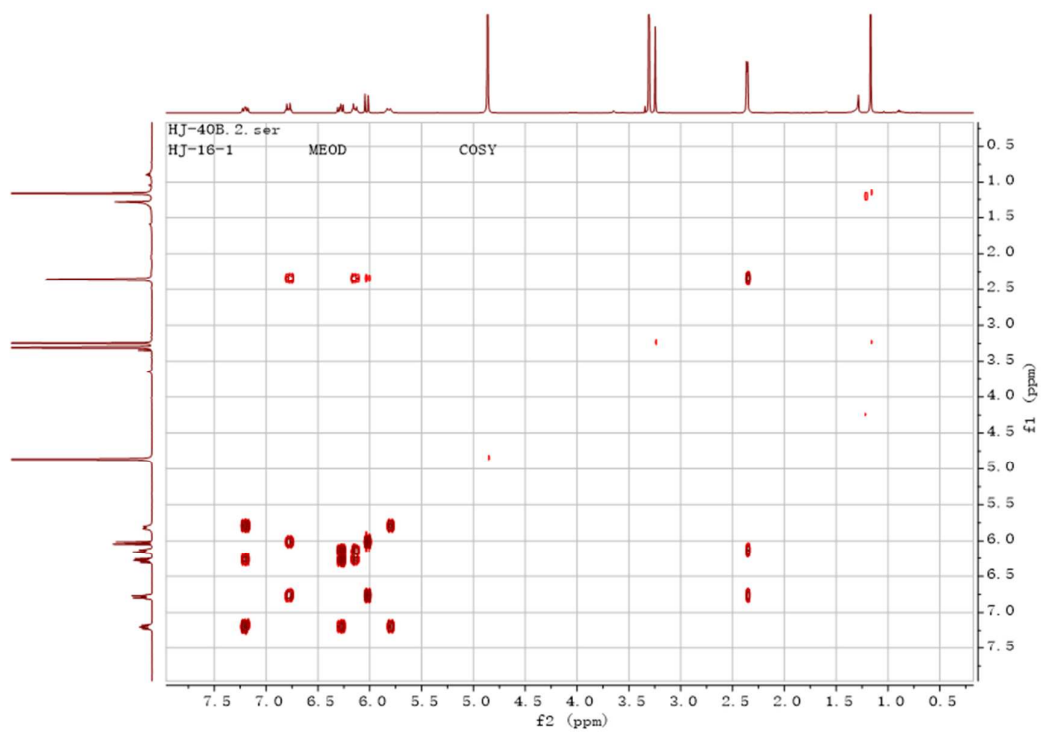


Fig. S7.3 ^1H - ^1H COSY spectrum (500 MHz) of ZP-amide I (**5**) in CD_3OD

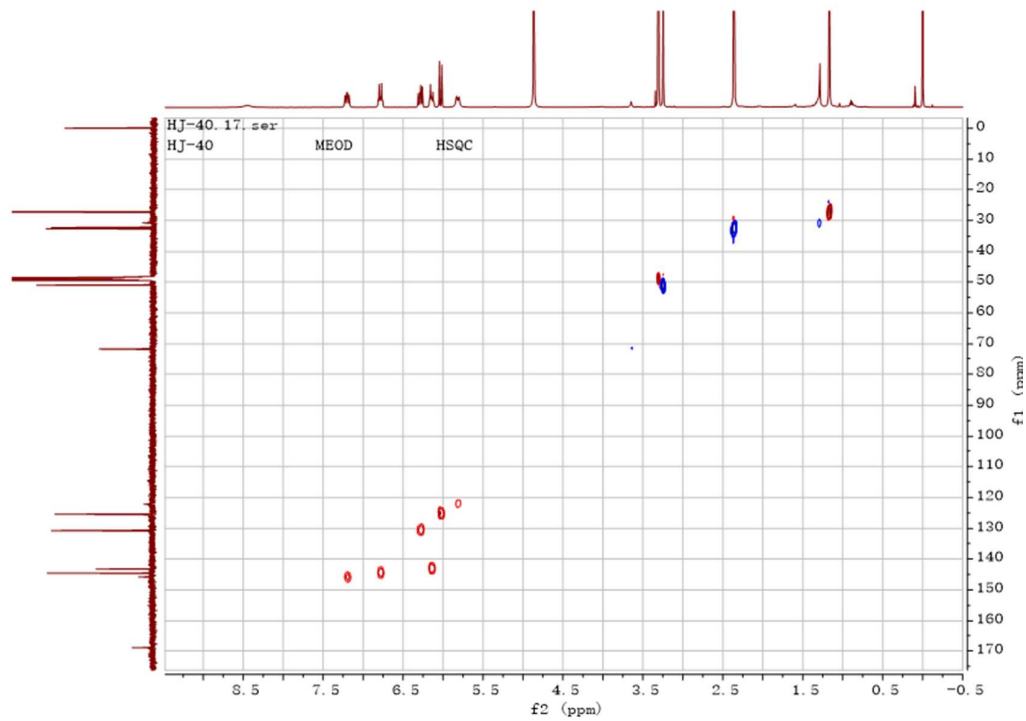


Fig. S7.4 HSQC spectrum (500 MHz) of ZP-amide I (**5**) in CD_3OD

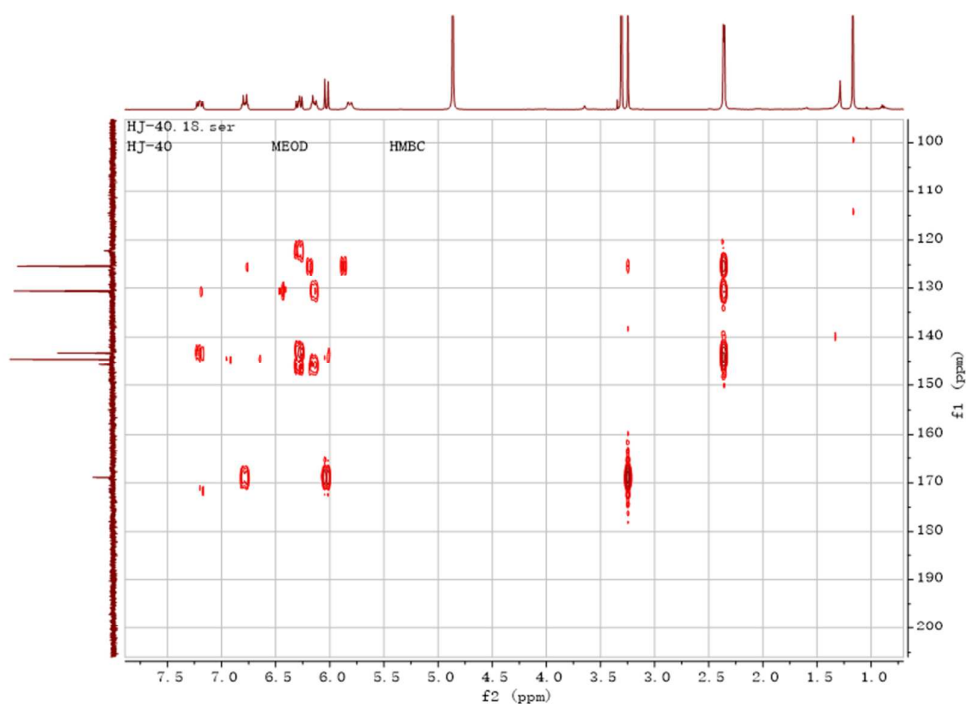
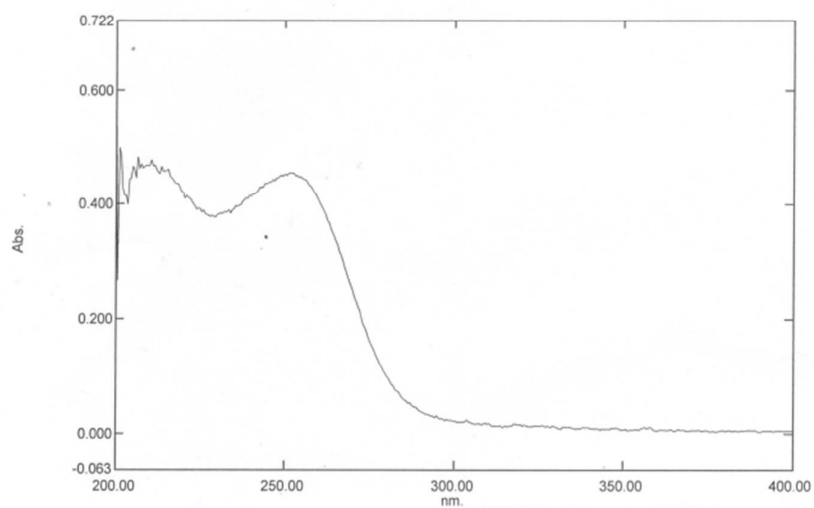


Fig. S7.5 HMBC spectrum (500 MHz) of ZP-amide I (**5**) in CD₃OD

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2017-09-27 17:28:21

Data Set: Storage 172745 - RawData - D:\2017\file_170927_172745.spc



No.	P/V	Wavelength	Abs.	Description
1	☉	389.00	0.006	
2	☉	326.50	0.014	
3	☉	251.50	0.455	
4	☉	377.50	0.003	
5	☉	314.50	0.011	
6	☉	229.50	0.377	

Fig. S7.6 UV spectrum of ZP-amide I (**5**)

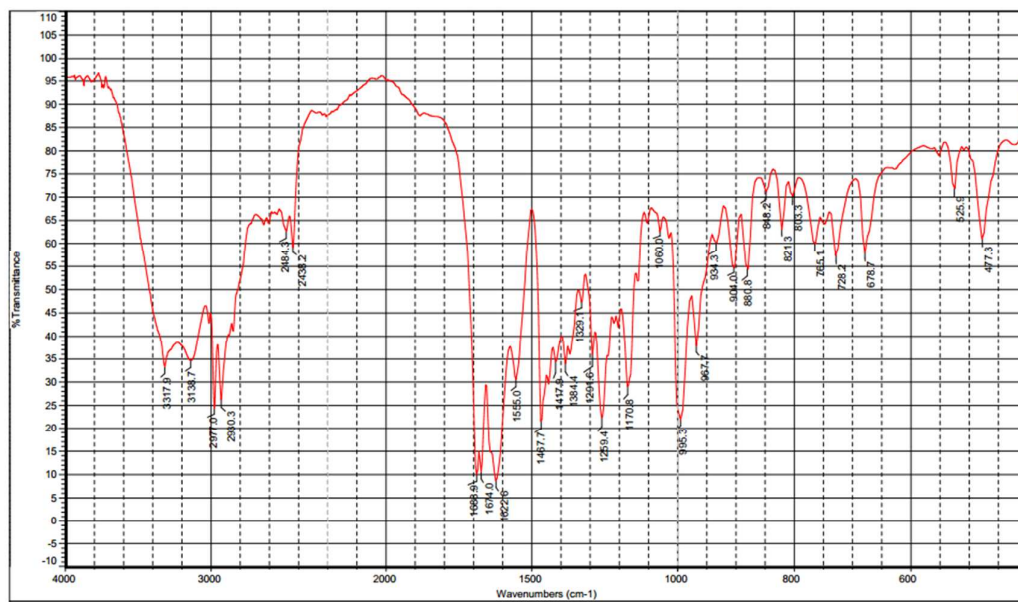


Fig. S7.7 IR spectrum of ZP-amide I (5)

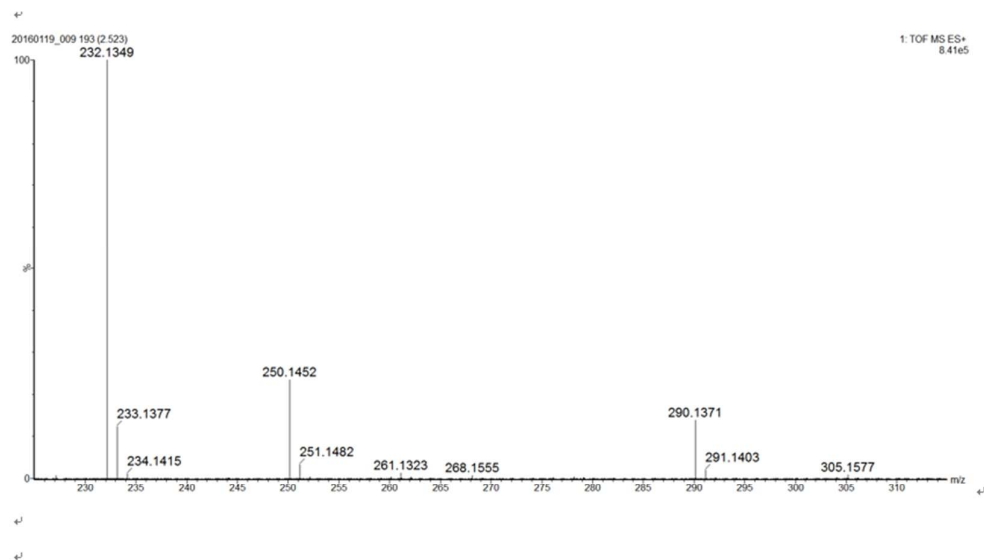


Fig. S7.8 HRESIMS spectrum of ZP-amide I (5)

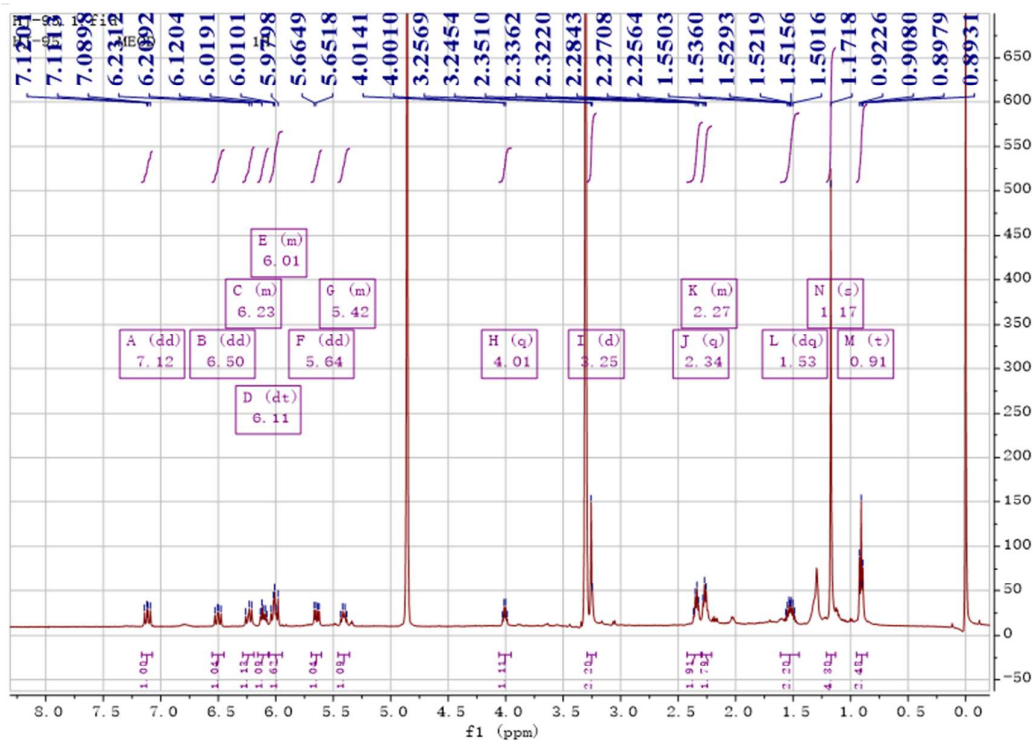


Fig. S8.1 ¹H NMR spectrum (500 MHz) of (±)-ZP-amide J (6) in CD₃OD

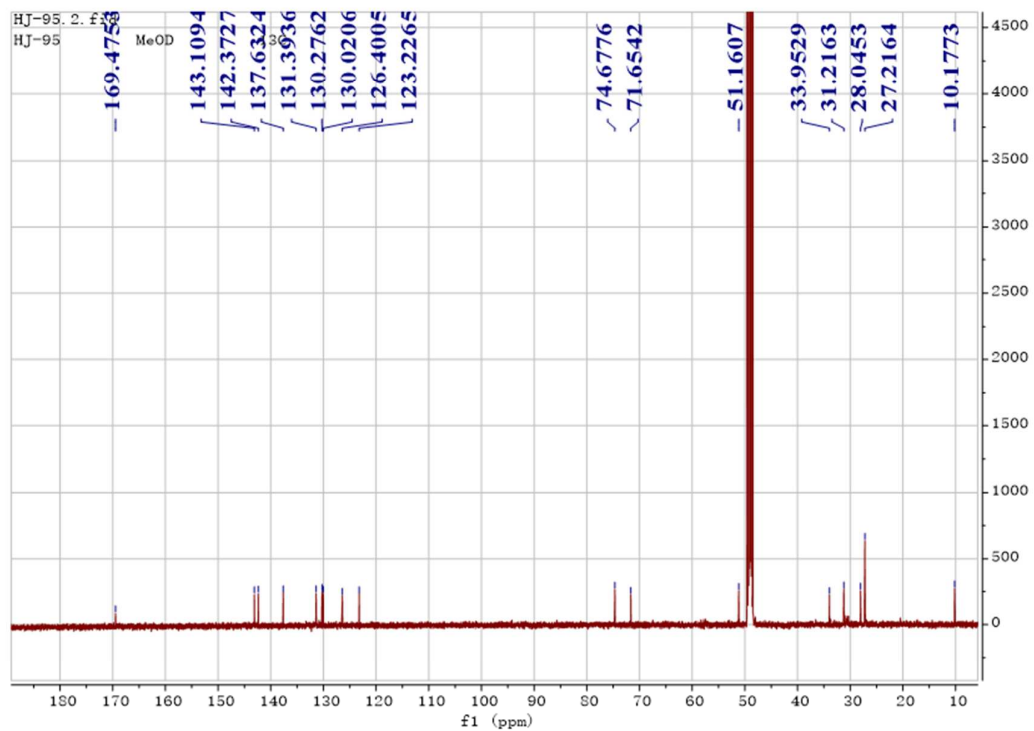


Fig. S8.2 ¹³C NMR spectrum (125 MHz) of (±)-ZP-amide J (6) in CD₃OD

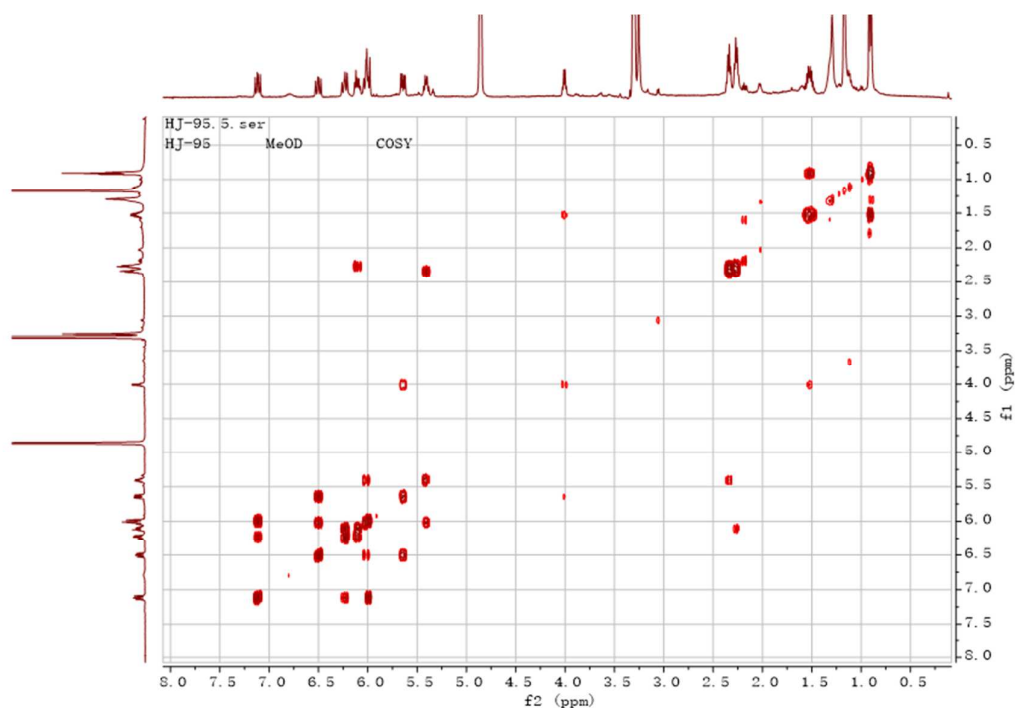


Fig. S8.3 ^1H - ^1H COSY spectrum (500 MHz) of ($\pm$)-ZP-amide J (**6**) in CD_3OD

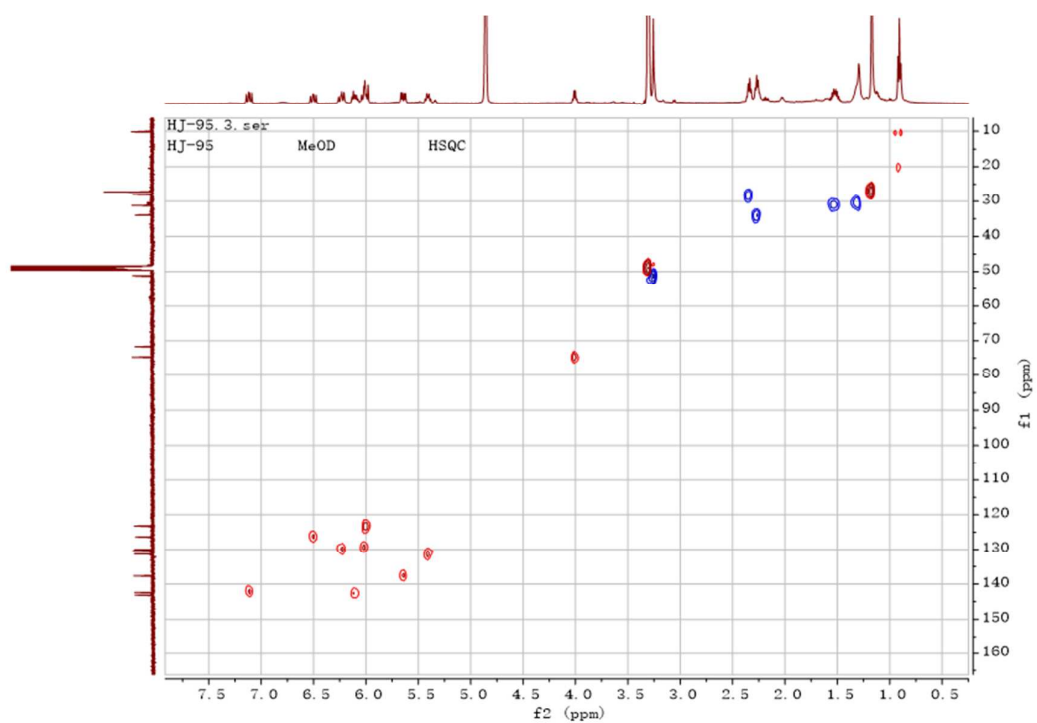


Fig. S8.4 HSQC spectrum (500 MHz) of ($\pm$)-ZP-amide J (**6**) in CD_3OD

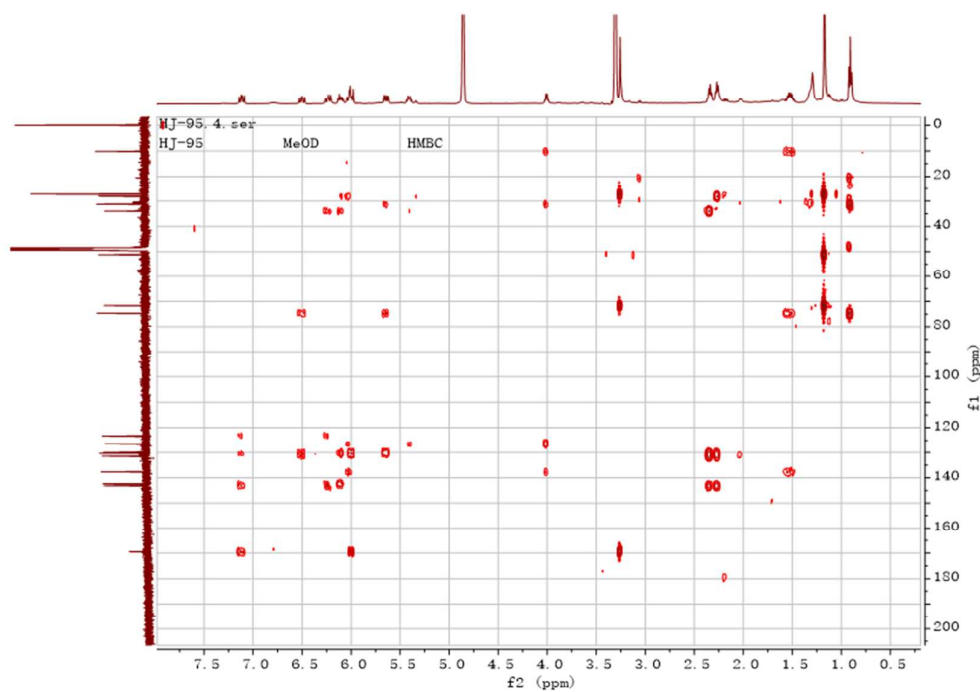
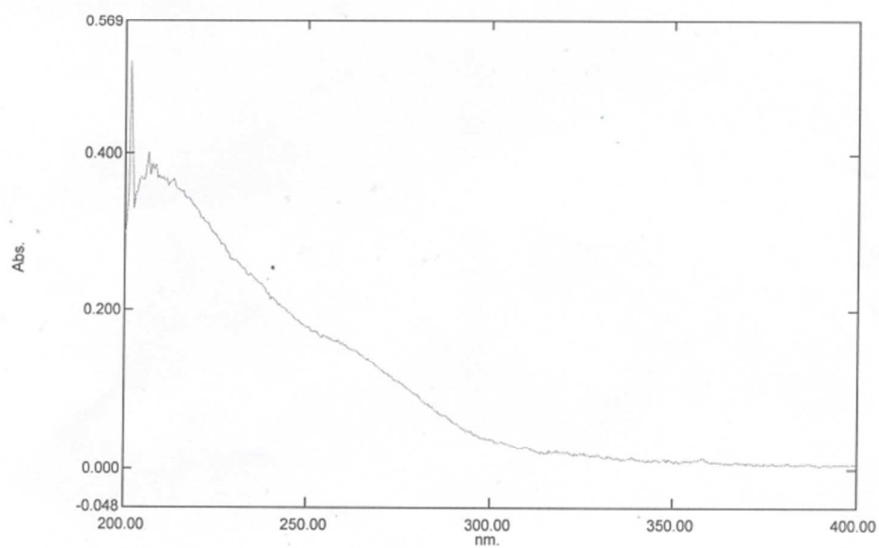


Fig. S8.5 HMBC spectrum (500 MHz) of (±)-ZP-amide J (6) in CD₃OD

Auto Print Report 1

2017-09-27 17:50:24

Data Set: Storage 174949 - RawData - D:\2017\File_170927_174949.spc



No.	P/V	Wavelength	Abs.	Description
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2	⊖	352.00	0.007	

Fig. S8.6 UV spectrum of (±)-amide J (6)

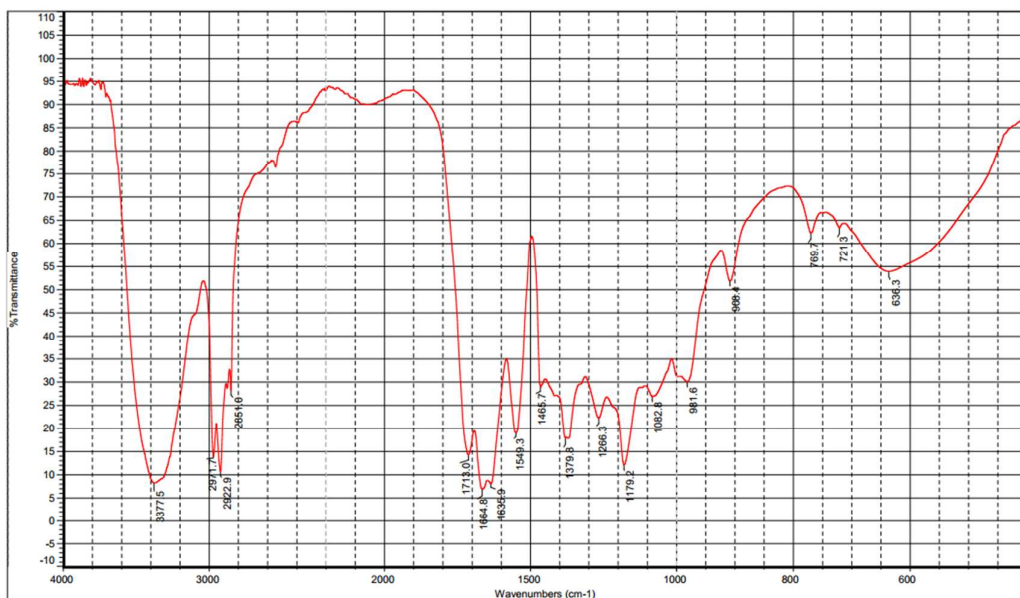


Fig. S8.7 IR spectrum of (±)-ZP-amide J (6)

HJ-95_170524150105 #1 RT: 0.00 AV: 1 NL: 8.60E5
T: FTMS + p ESI Full ms [300.00-400.00]

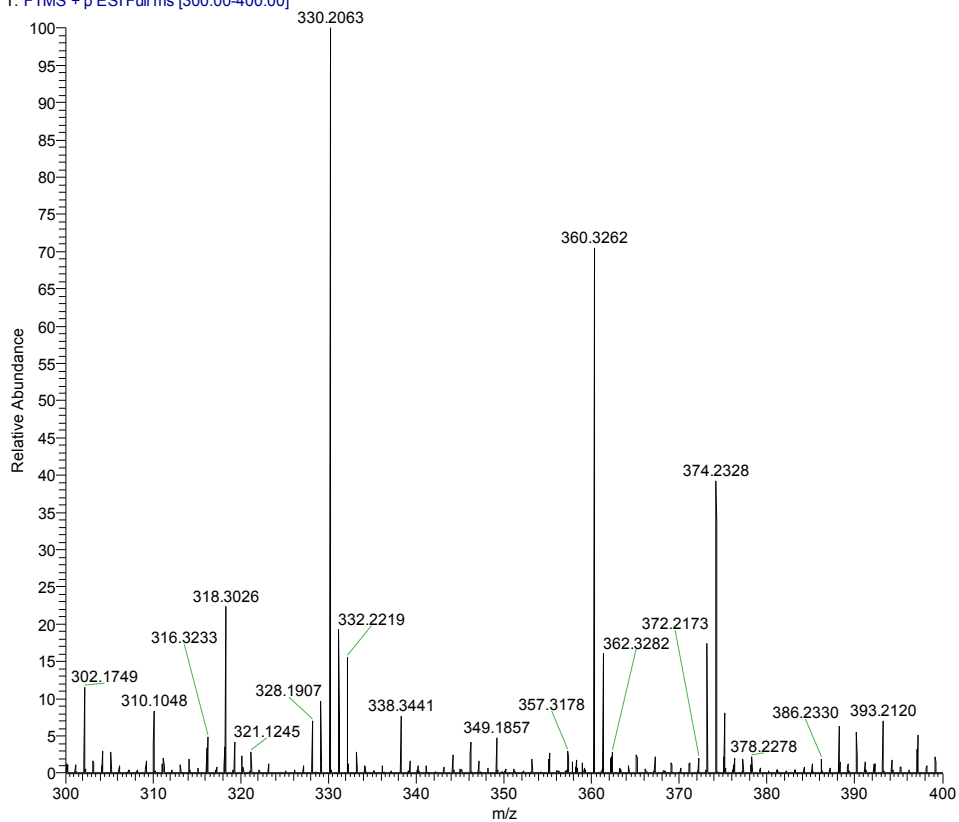


Fig. S8.8 HRESIMS spectrum of (±)-ZP-amide J (6)

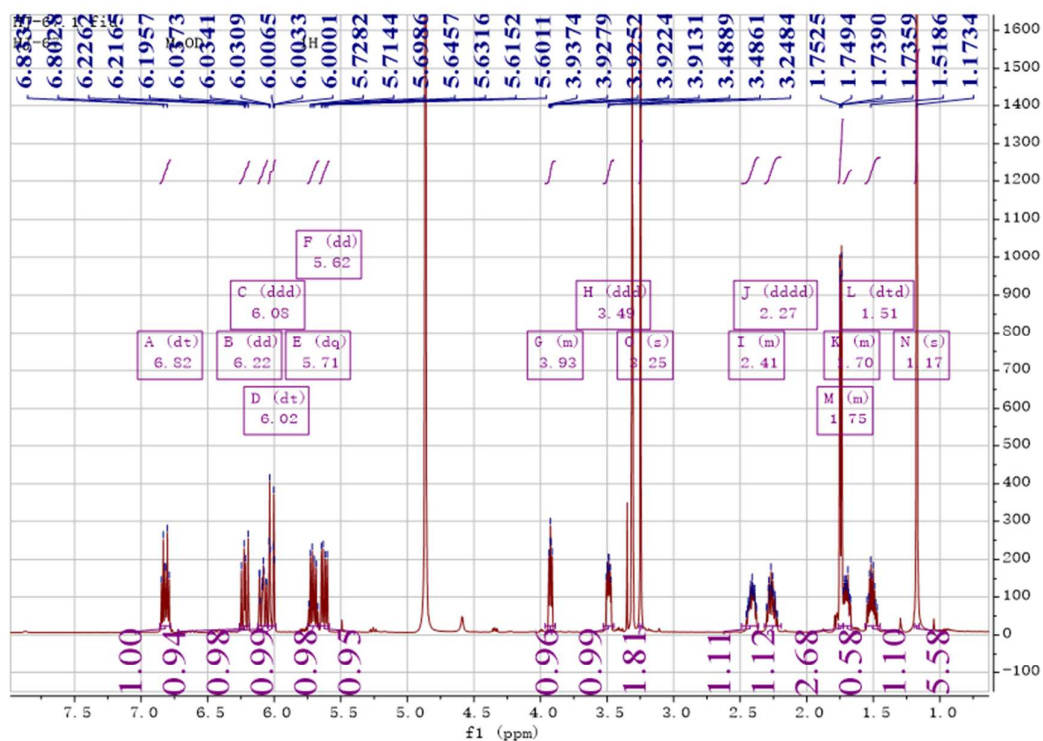


Fig. S9.1 ¹H NMR spectrum (500 MHz) of (±)-ZP-amide K (7) in CD₃OD

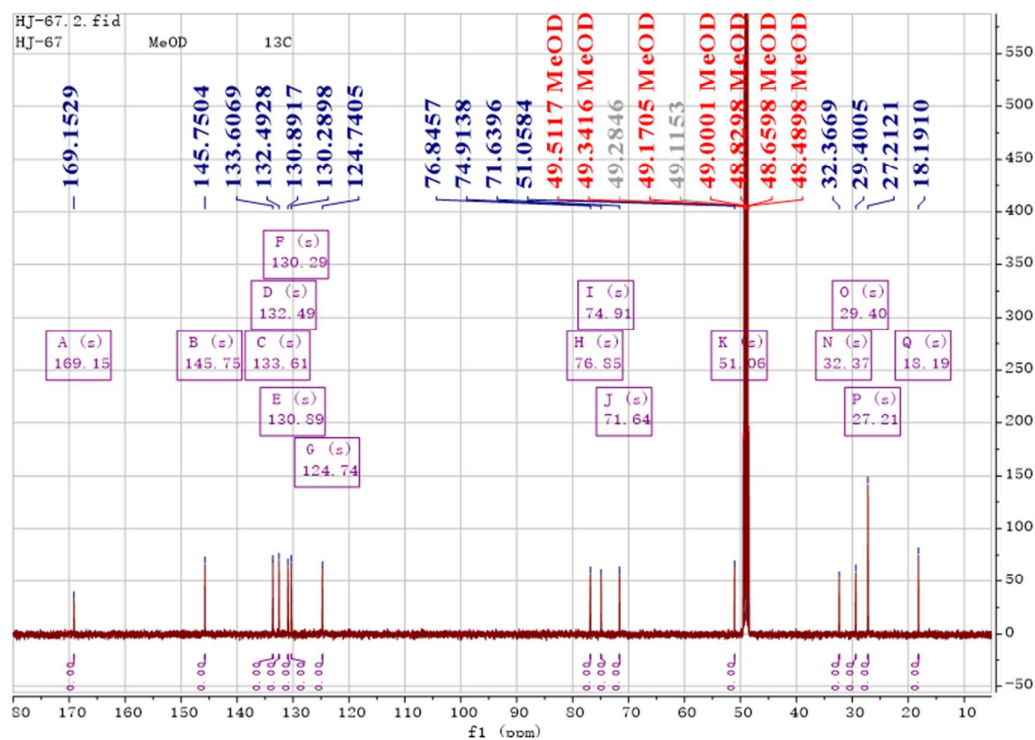


Fig. S9.2 ¹³C NMR spectrum (125 MHz) of (±)-ZP-amide K (7) in CD₃OD

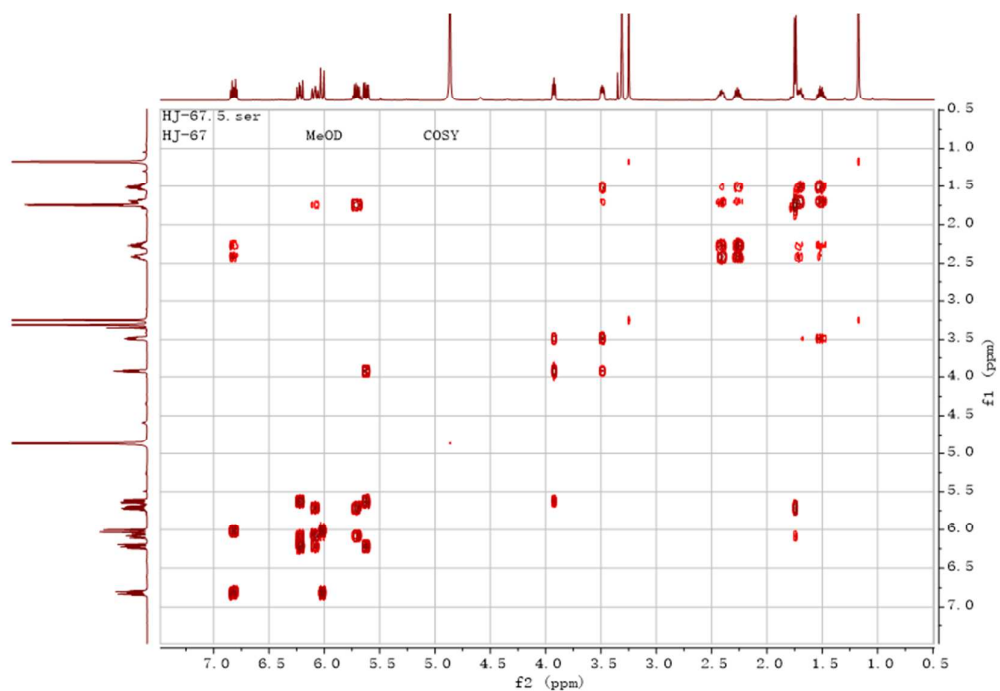


Fig. S9.3 ^1H - ^1H COSY spectrum (500 MHz) of $(\pm)$ -ZP-amide K (7) in CD_3OD

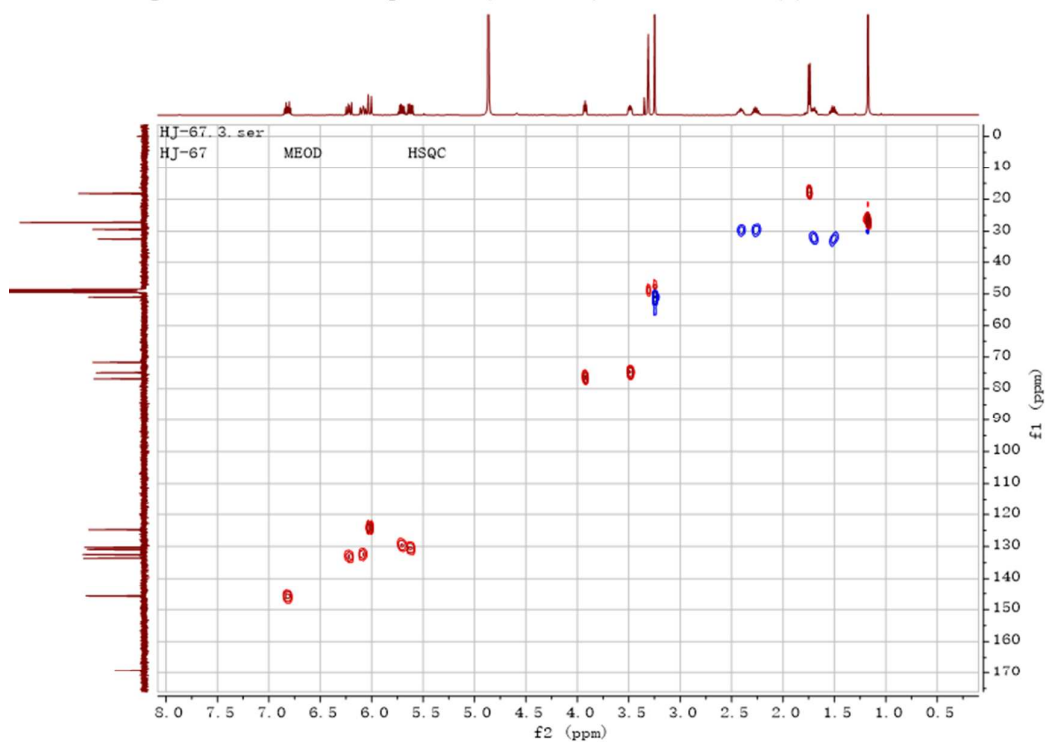


Fig. S9.4 HSQC spectrum (500 MHz) of $(\pm)$ -ZP-amide K (7) in CD_3OD

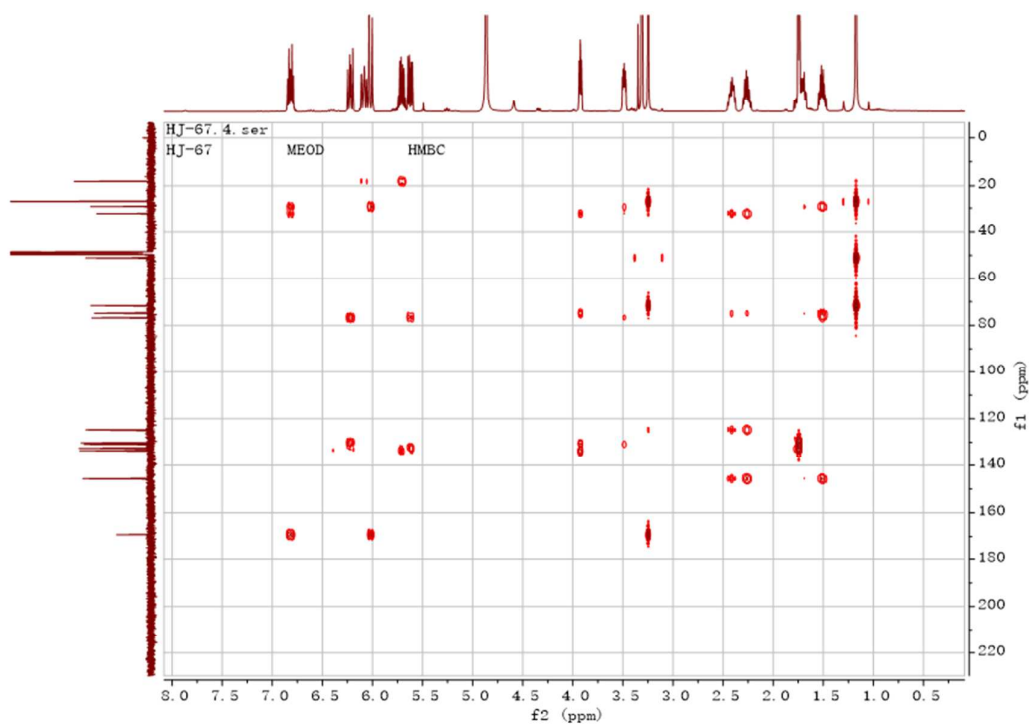


Fig. S9.5 HMBC spectrum (500 MHz) of (±)-ZP-amide K (7) in CD₃OD

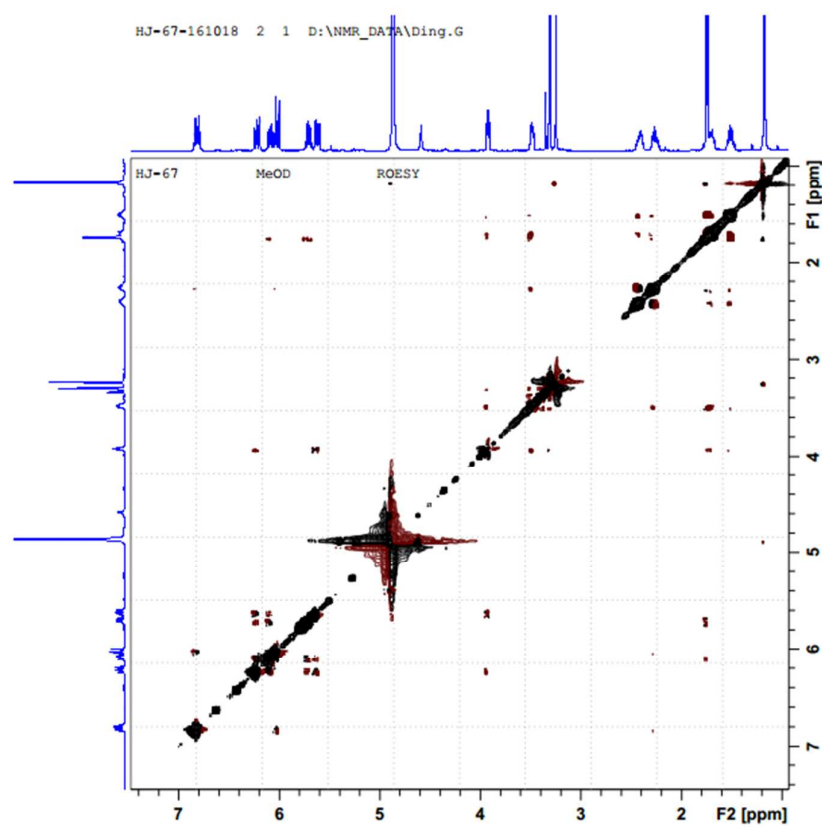


Fig. S9.6 ROESY spectrum (500 MHz) of (±)-ZP-amide K (7) in CD₃OD



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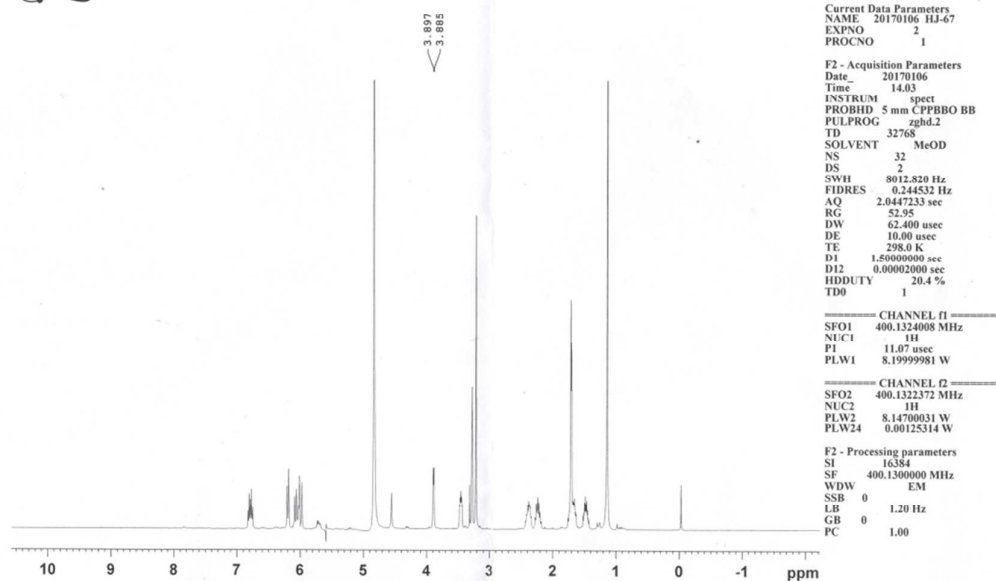
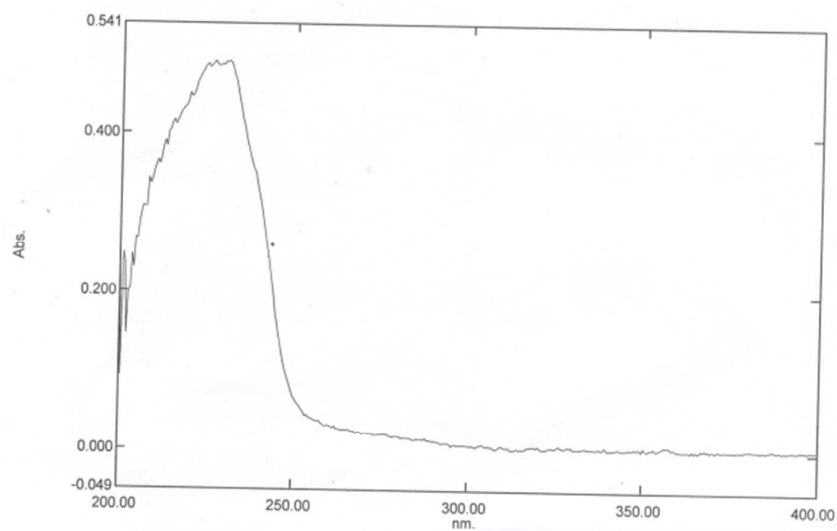


Fig. S9.7 Proton homodecoupling spectrum (400 MHz) of (±)-ZP-amide K (7) in CD₃OD

Auto Print Report 1

2017-09-27 17:39:21

Data Set: Storage 173853 - RawData - D:\2017\File_170927_173853.spc



No.	P/V	Wavelength	Abs.	Description
1	①	276.00	0.021	
2	②	230.50	0.492	
3	③	364.00	0.000	
4	④	273.50	0.020	

Fig. S9.8 UV spectrum of (±)-ZP-amide K (7)

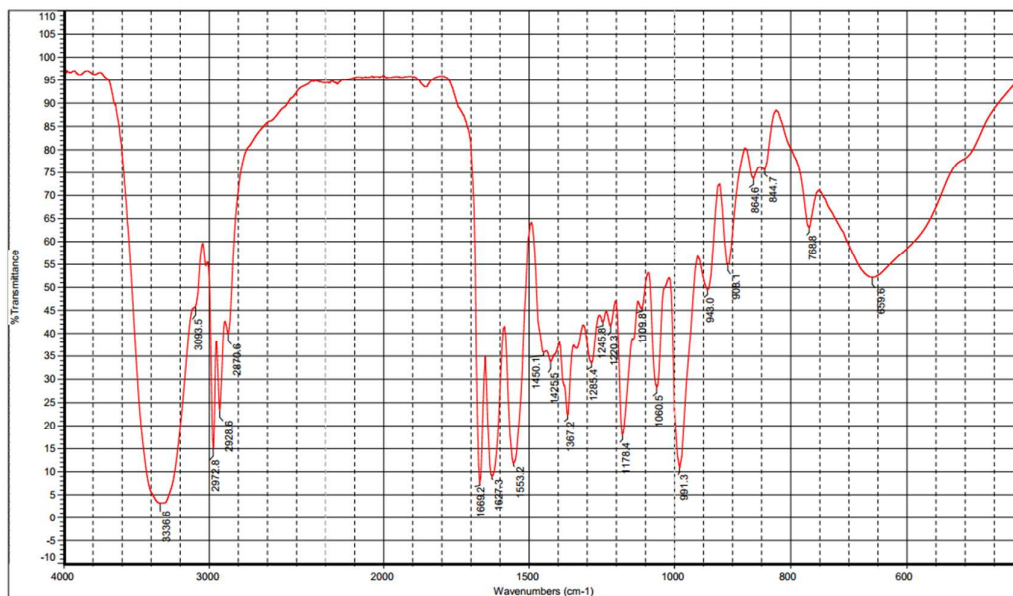


Fig. S9.9 IR spectrum of (±)-ZP-amide K (7)

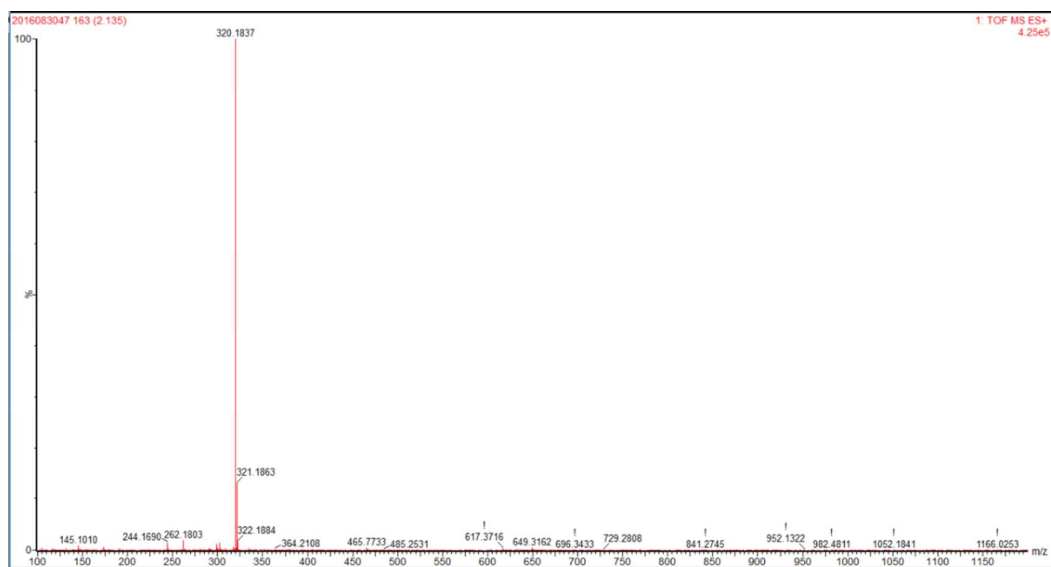


Fig. S9.10 HRESIMS spectrum of (±)-ZP-amide K (7)

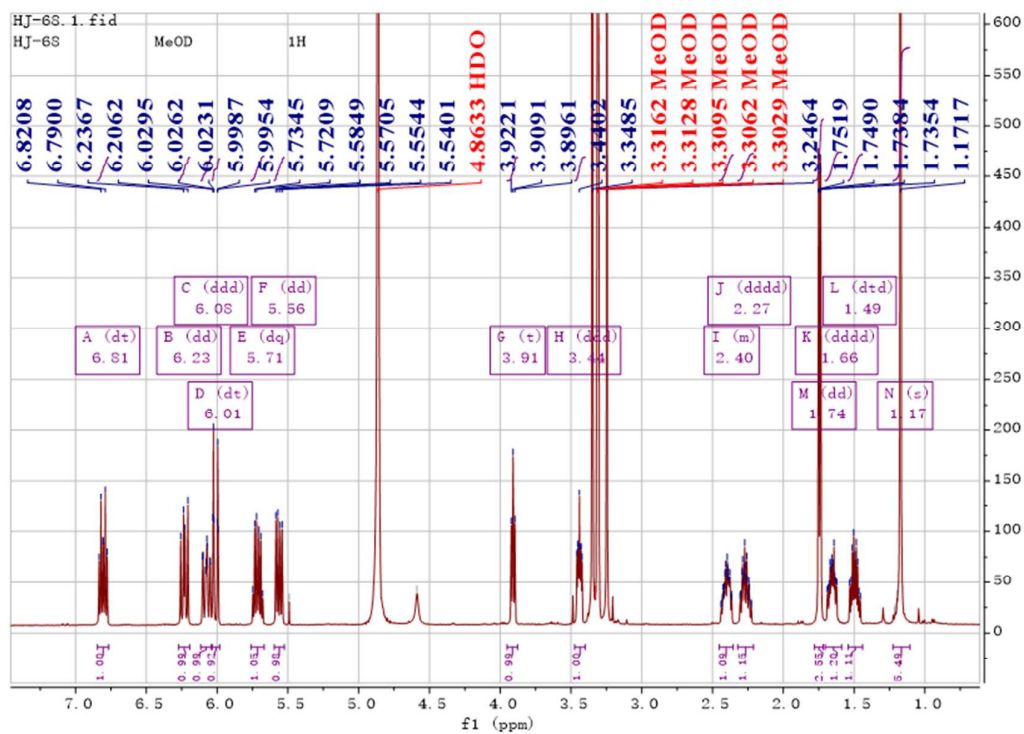


Fig. S10.1 ¹H NMR spectrum (500 MHz) of (±)-ZP-amide L (**8**) in CD₃OD

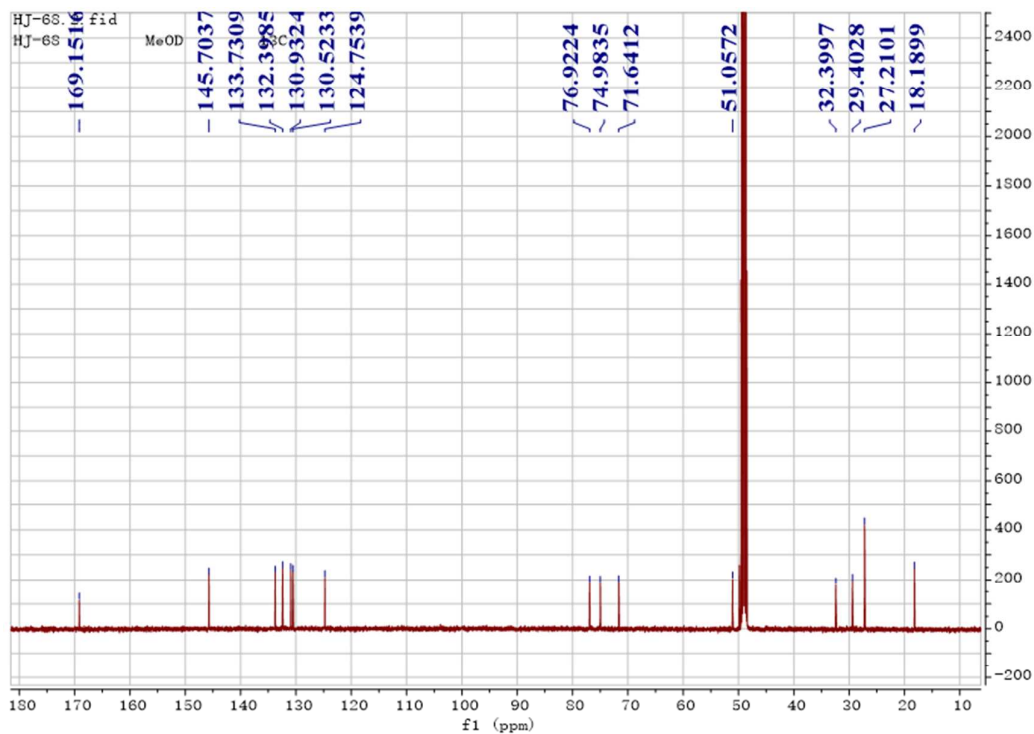


Fig. S10.2 ¹³C NMR spectrum (125 MHz) of (±)-ZP-amide L (**8**) in CD₃OD

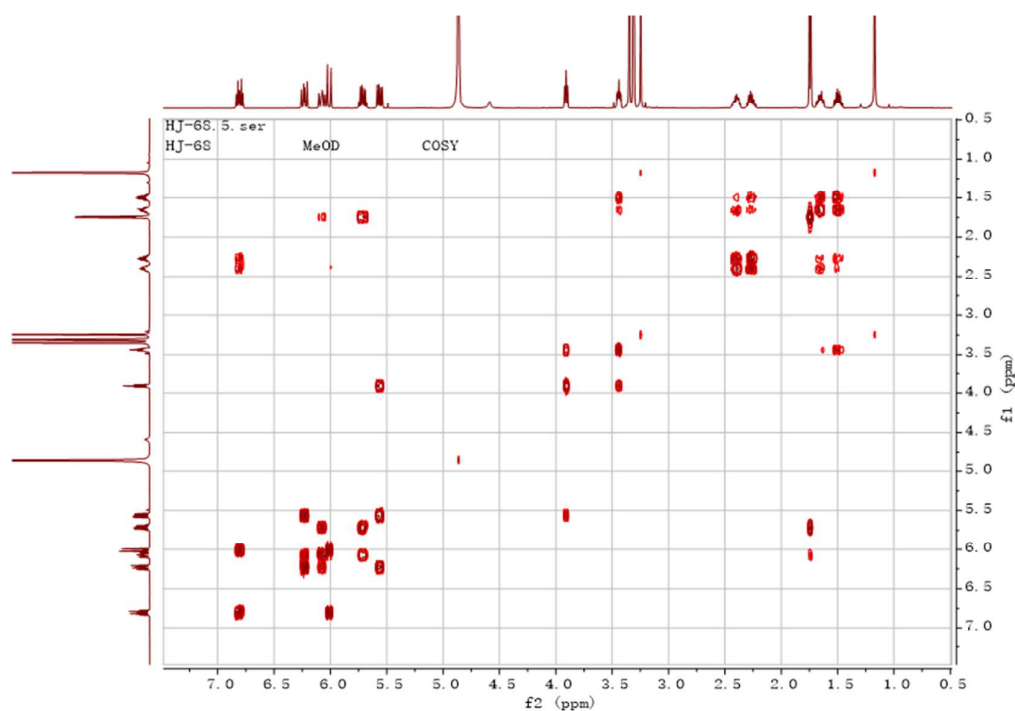


Fig. S10.3 ^1H - ^1H COSY spectrum (500 MHz) of ($\pm$)-ZP-amide L (**8**) in CD_3OD

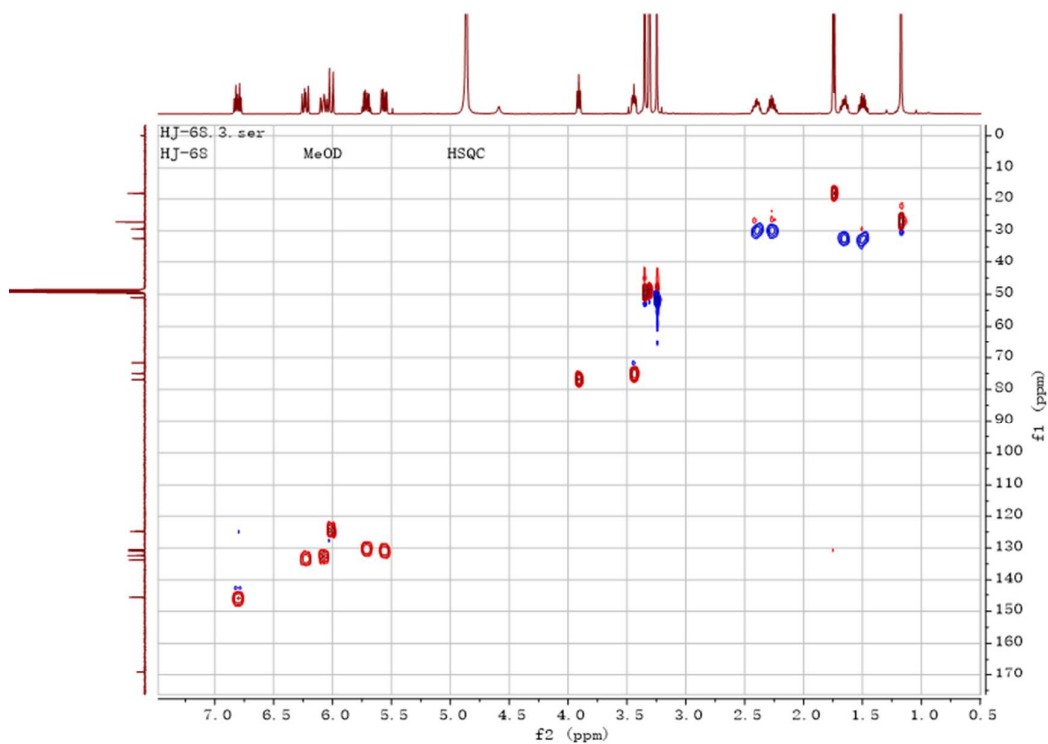


Fig. S10.4 HSQC spectrum (500 MHz) of ($\pm$)-ZP-amide L (**8**) in CD_3OD

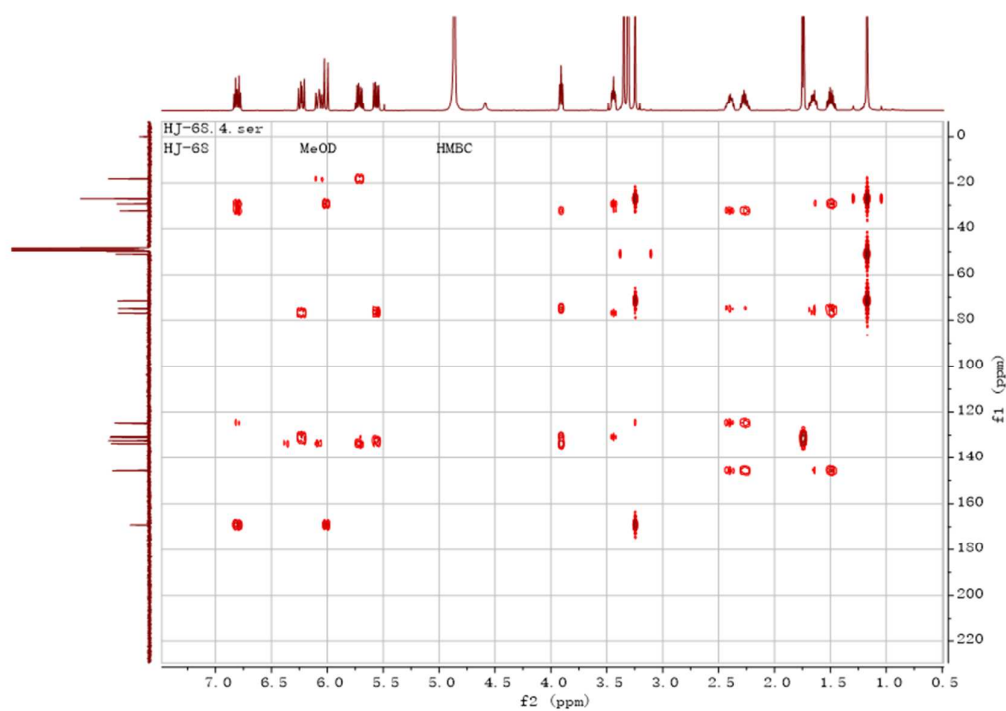


Fig. S10.5 HMBC spectrum (500 MHz) of (±)-ZP-amide L (**8**) in CD₃OD

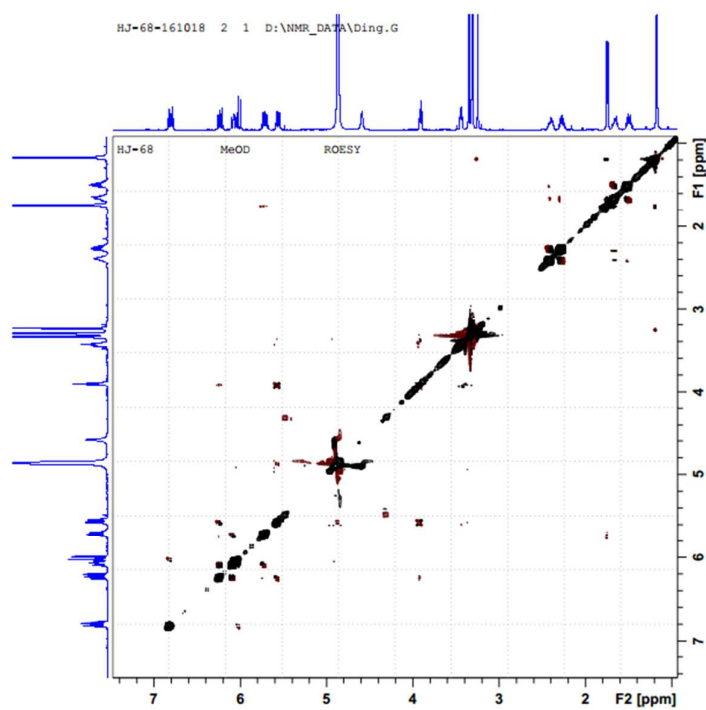


Fig. S10.6 ROESY spectrum (500 MHz) of (±)-ZP-amide L (**8**) in CD₃OD



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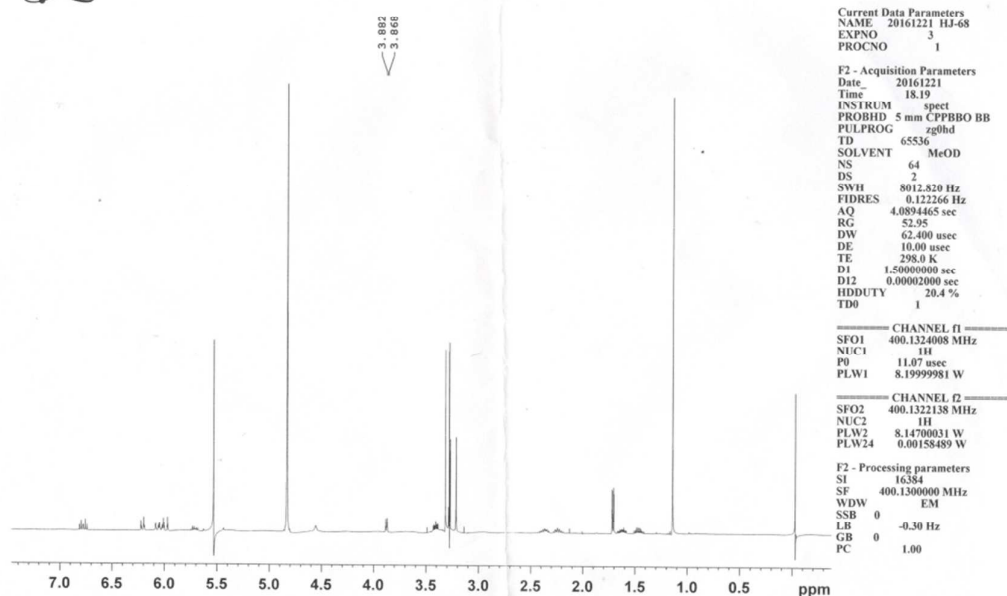
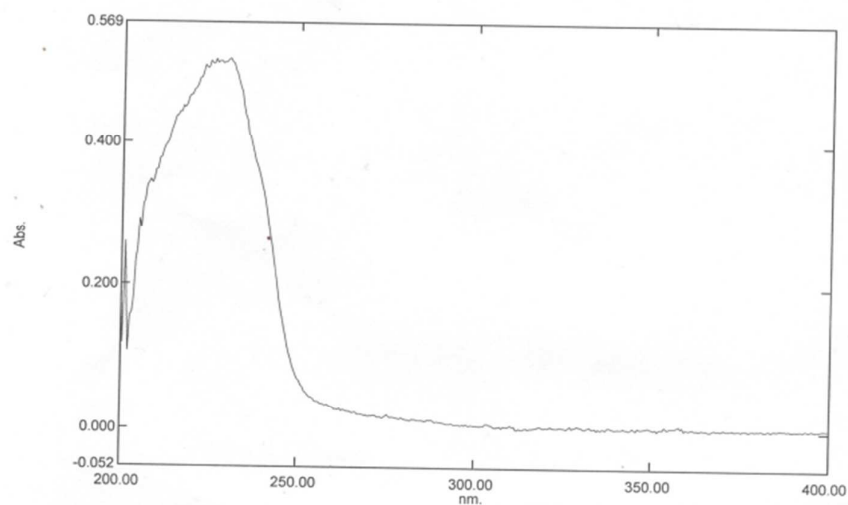


Fig. S10.7 Proton homodecoupling spectrum (400 MHz) of (±)-ZP-amide L (**8**) in CD₃OD

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2017-09-27 17:41:40

Data Set: Storage 174121 - RawData - D:\2017\File_170927_174121.spc



No.	P/V	Wavelength	Abs.	Description
1	⊕	329.50	0.006	
2	⊕	230.00	0.518	
3	⊕	335.00	0.001	
4	⊕	312.50	0.001	

Fig. S10.8 UV spectrum of (±)-ZP-amide L (**8**)

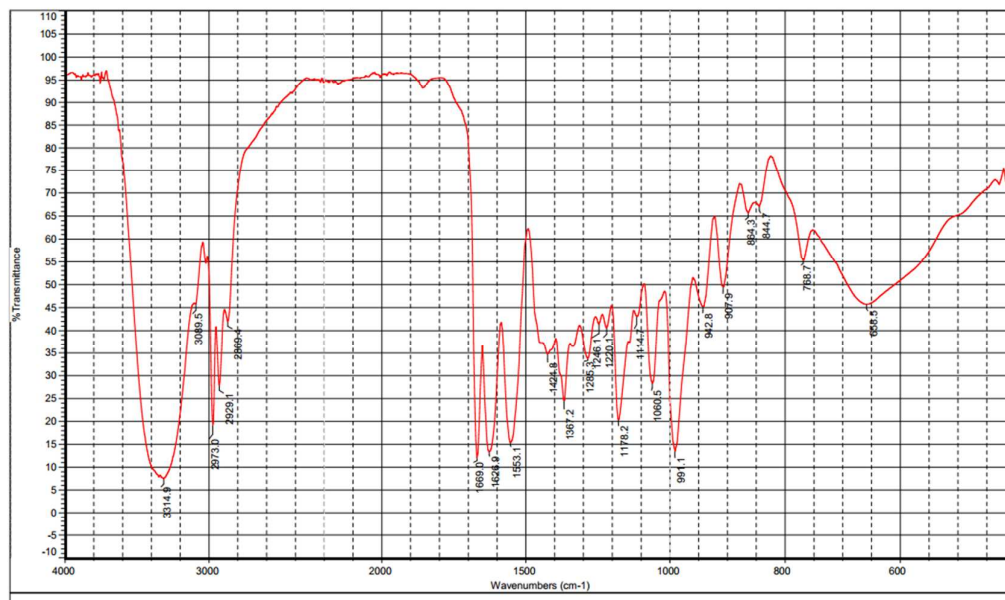


Fig. S10.9 IR spectrum of (±)-ZP-amide L (8)

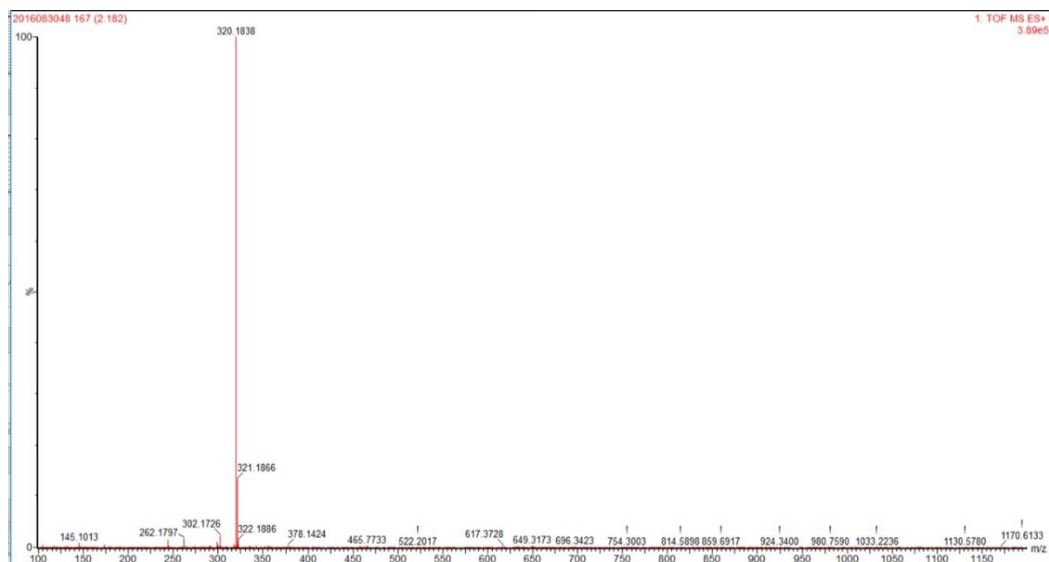


Fig. S10.10 HRESIMS spectrum of (±)-ZP-amide L (8)

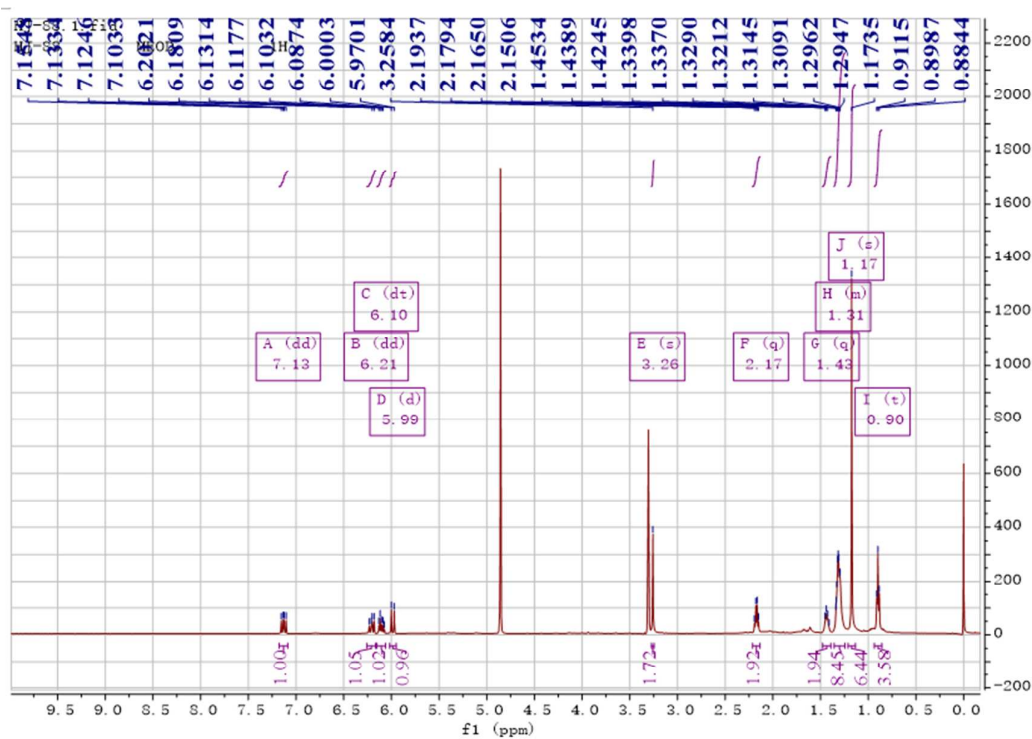


Fig. S11.1 ¹H NMR spectrum (500 MHz) of ZP-amide M (9) in CD₃OD

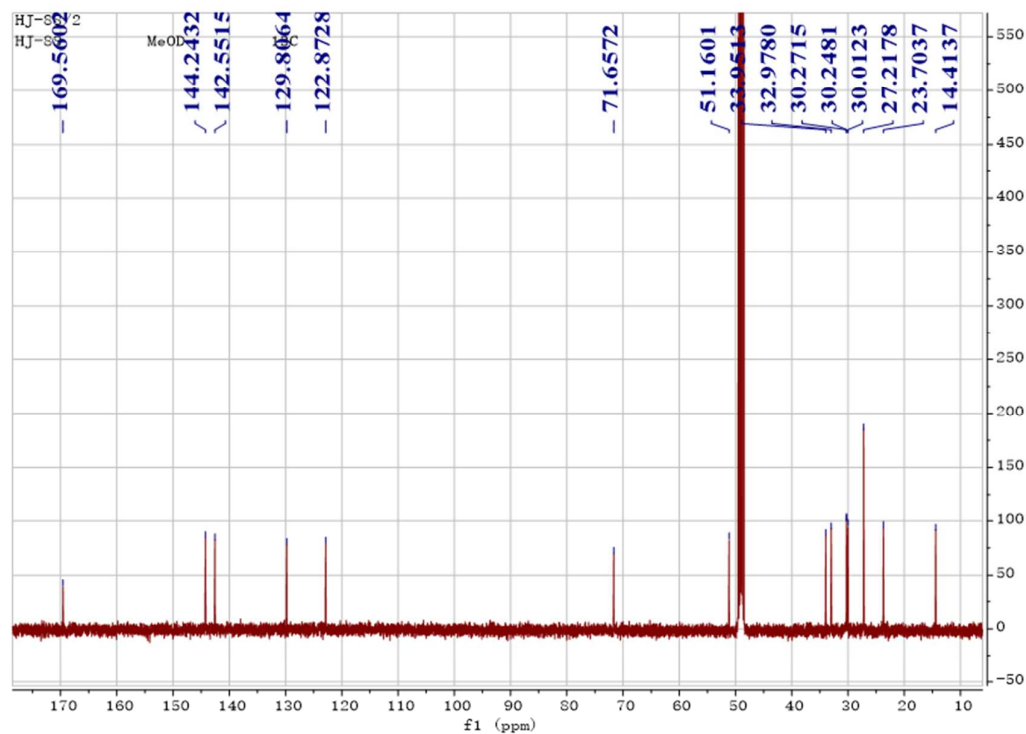


Fig. S11.2 ¹³C NMR spectrum (125 MHz) of ZP-amide M (9) in CD₃OD

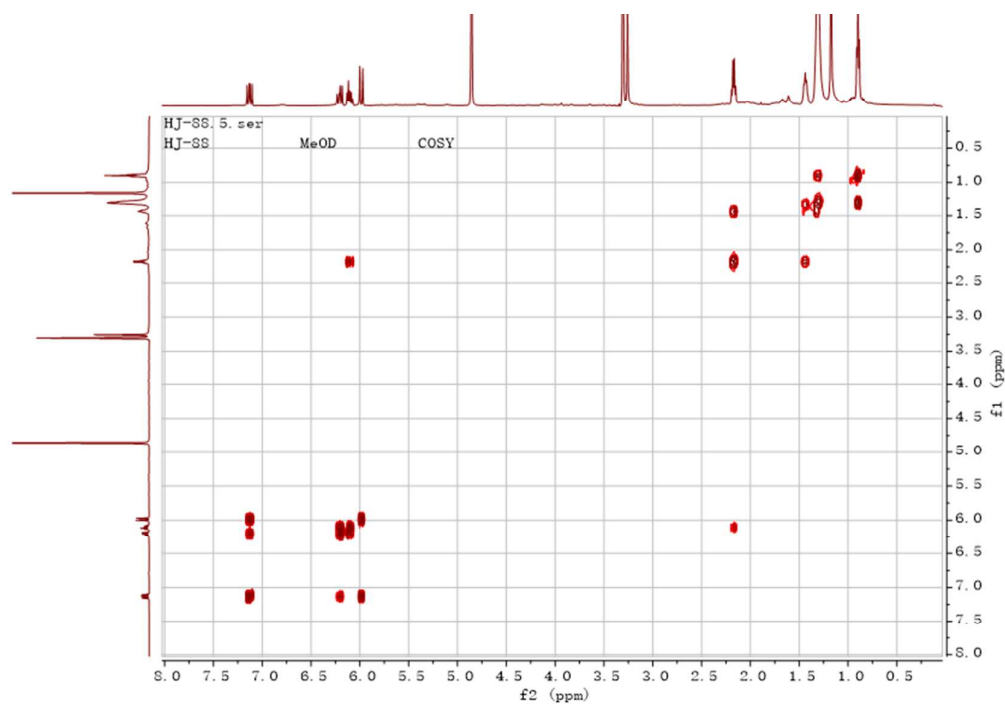


Fig. S11.3 ^1H - ^1H COSY spectrum (500 MHz) of ZP-amide M (**9**) in CD_3OD

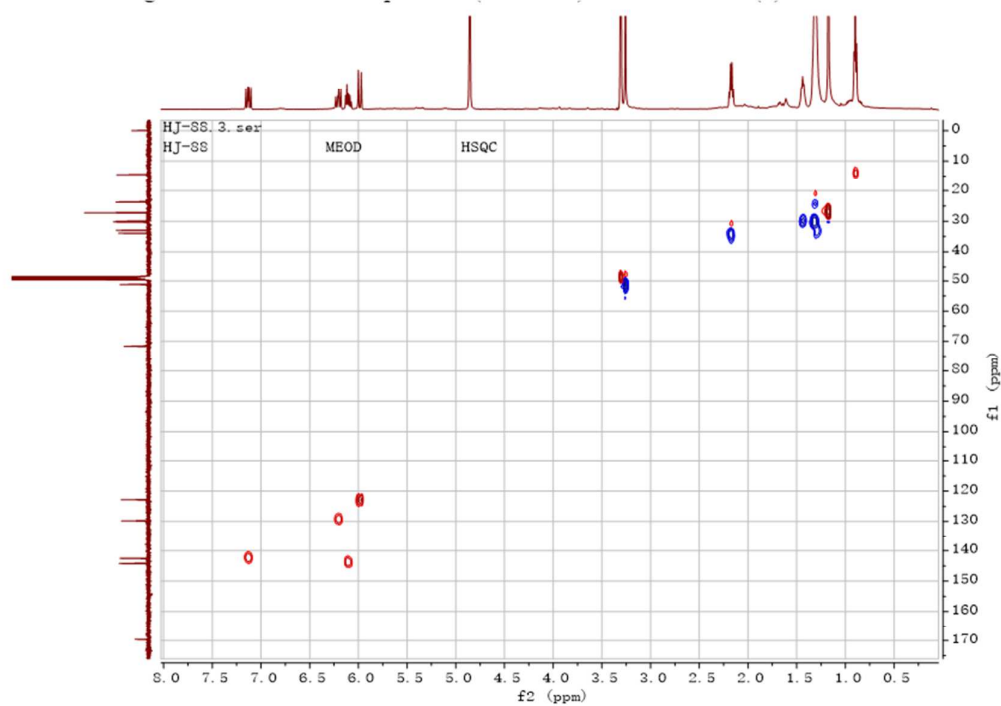


Fig. S11.4 HSQC spectrum (500 MHz) of ZP-amide M (**9**) in CD_3OD

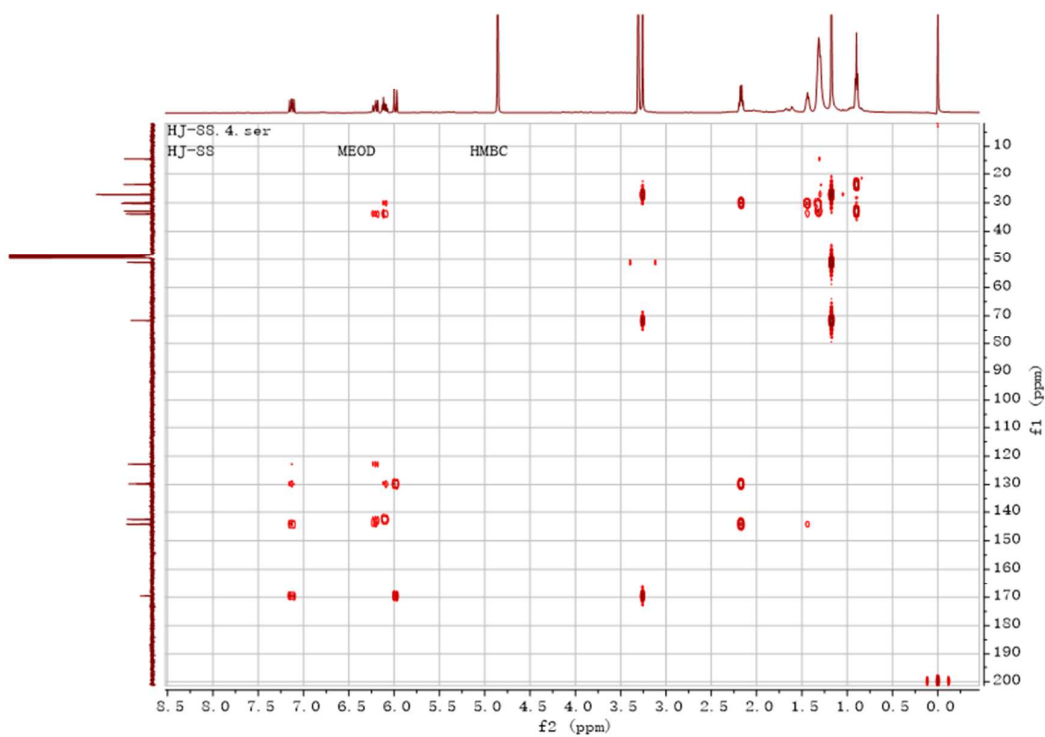
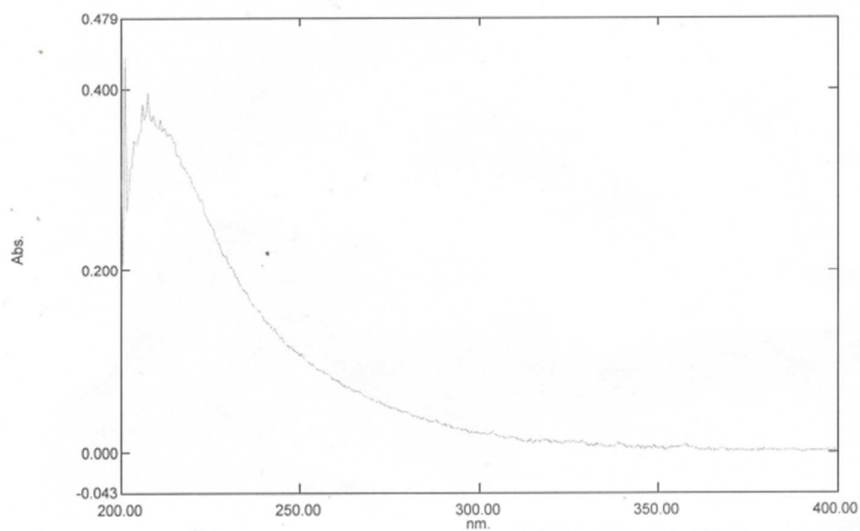


Fig. S11.5 HMBC spectrum (500 MHz) of ZP-amide M (9) in CD₃OD

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2017-09-27 17:43:56

Data Set: Storage 174329 - RawData - D:\2017\File_170927_174329.spc



No.	P/V	Wavelength	Abs.	Description
1	①	379.50	0.004	
2	②	207.50	0.395	
3	③	369.50	0.002	

Fig. S11.6 UV spectrum of ZP-amide M (9)

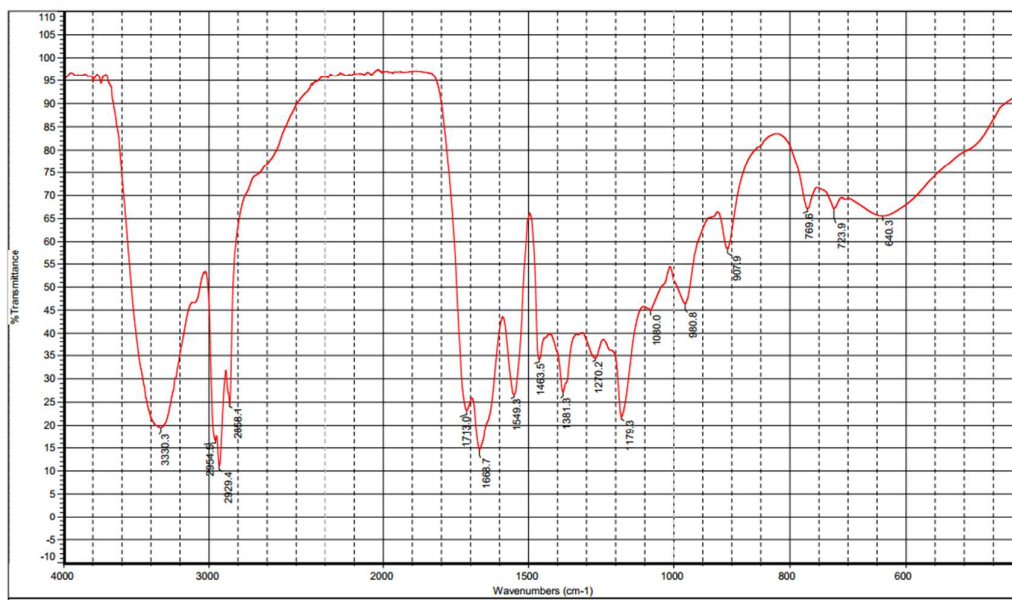


Fig. S11.7 IR spectrum of ZP-amide M (9)

HU-88_170524151709 #1 RT: 0.00 AV: 1 NL: 6.96E4
T: FTMS + p ESI Full ms [200.00-350.00]

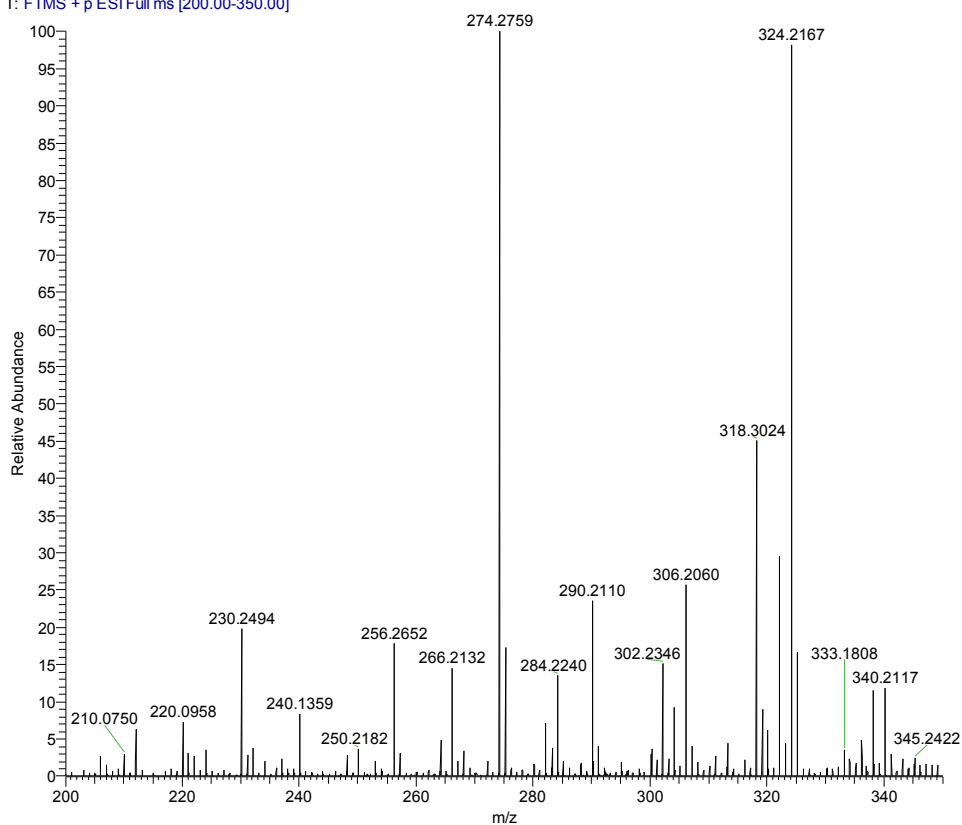


Fig. S11.8 HRESIMS spectrum of ZP-amide M (9)

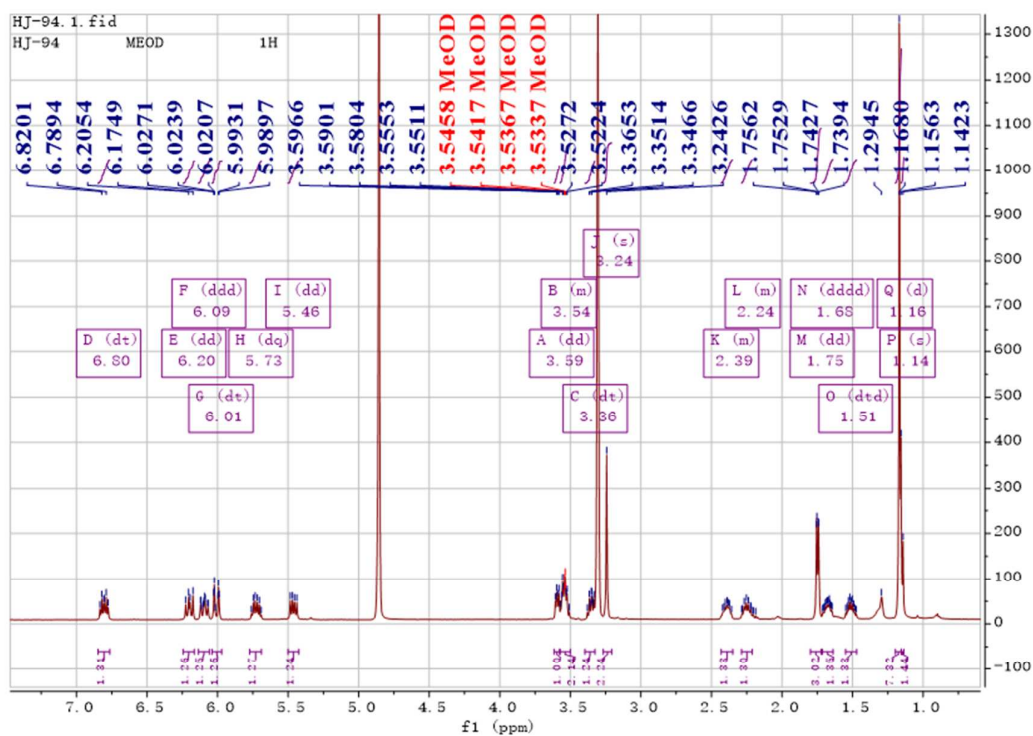


Fig. S12.1 ¹H NMR spectrum (500 MHz) of (±)-ZP-amide N (**10**) in CD₃OD

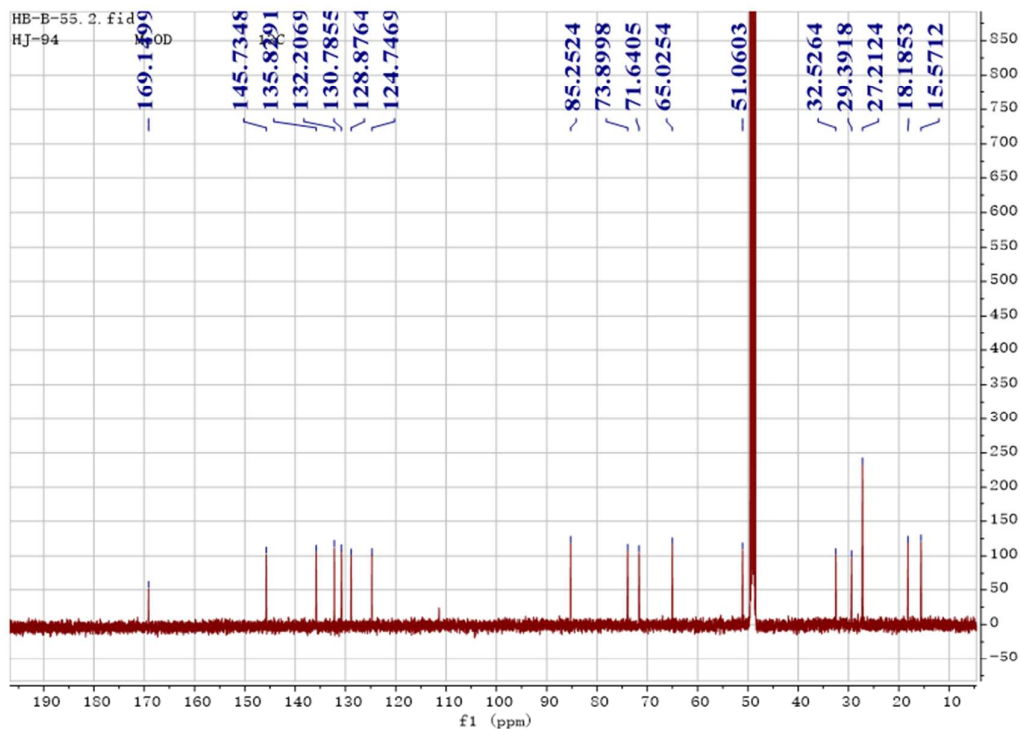


Fig. S12.2 ¹³C NMR spectrum (125 MHz) of (±)-ZP-amide N (**10**) in CD₃OD

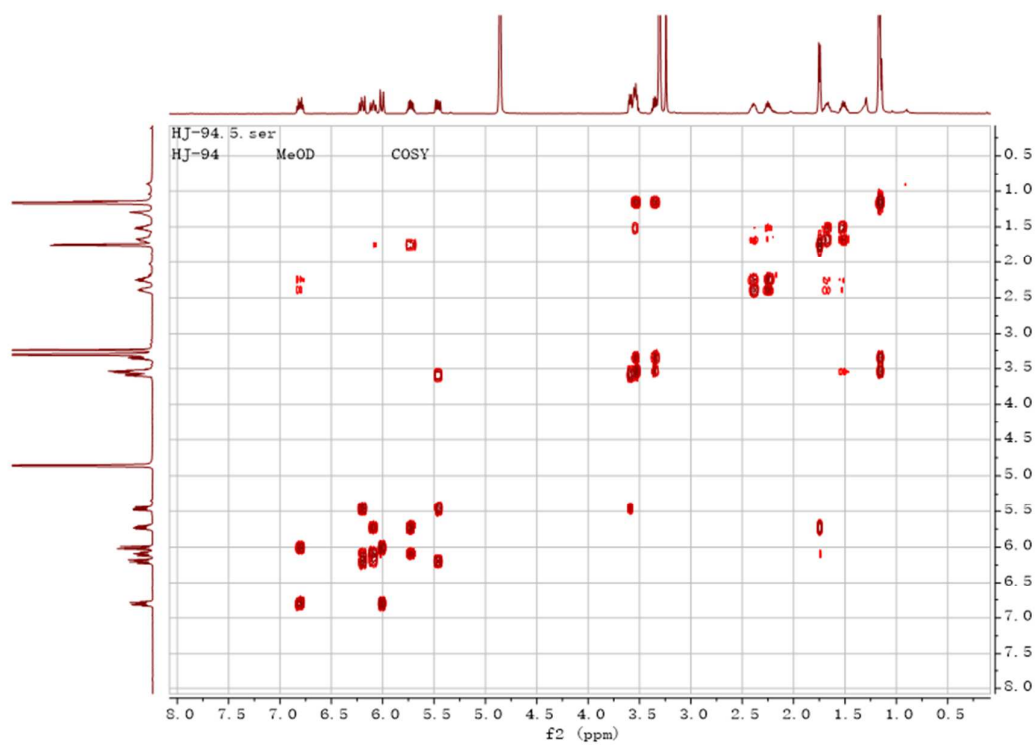


Fig. S12.3 ^1H - ^1H COSY spectrum (500 MHz) of (±)-ZP-amide N (**10**) in CD_3OD

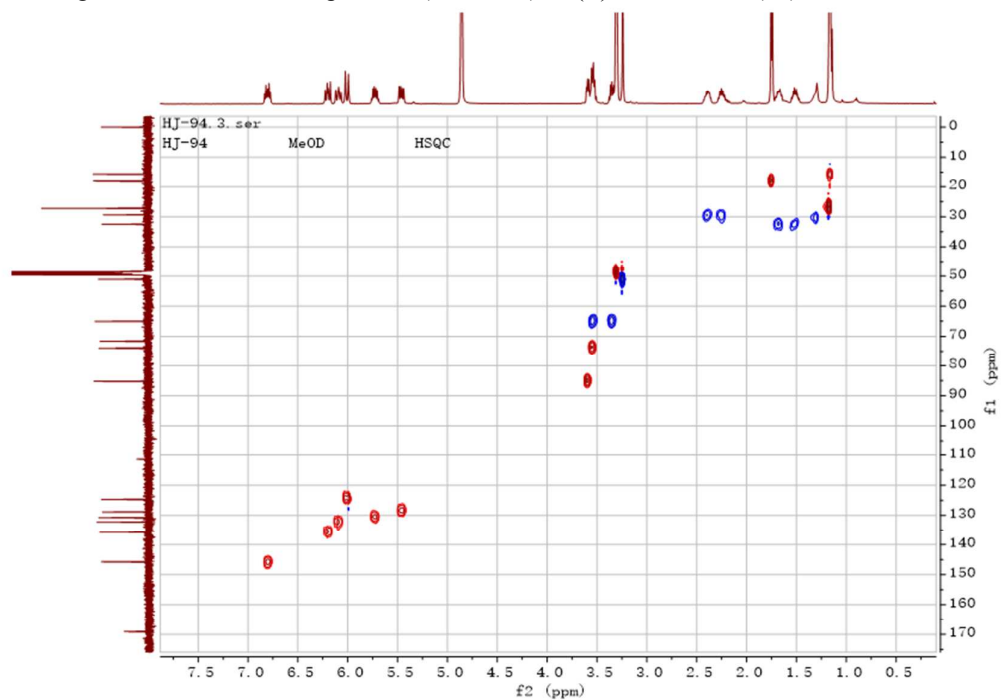


Fig. S12.4 HSQC spectrum (500 MHz) of (±)-ZP-amide N (**10**) in CD_3OD

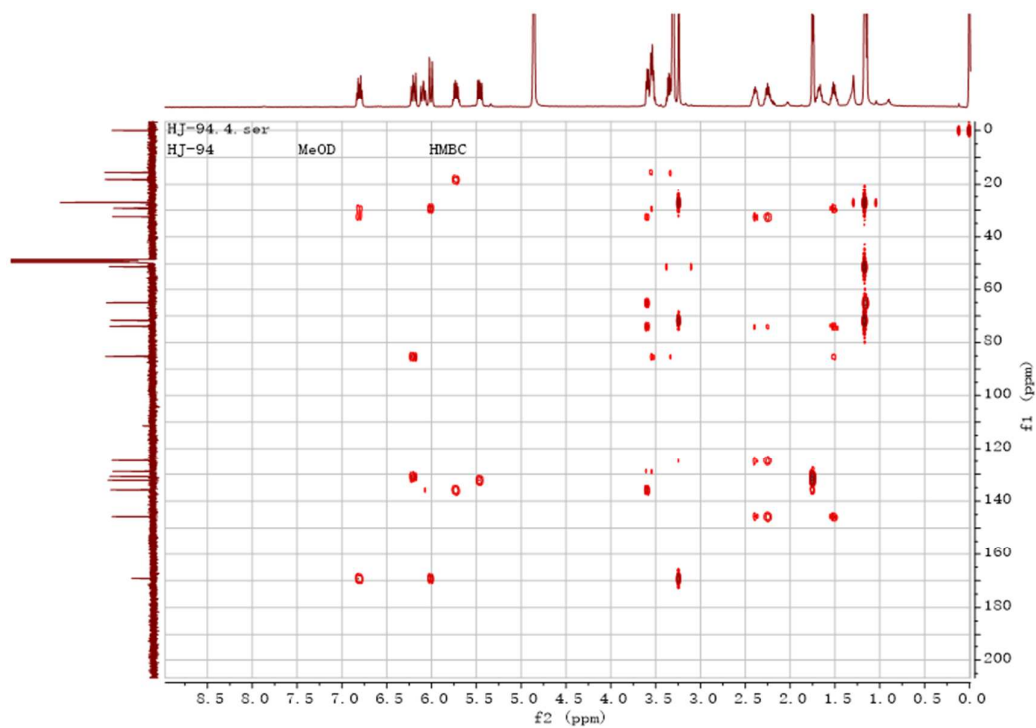


Fig. S12.5 HMBC spectrum (500 MHz) of (±)-ZP-amide N (**10**) in CD₃OD

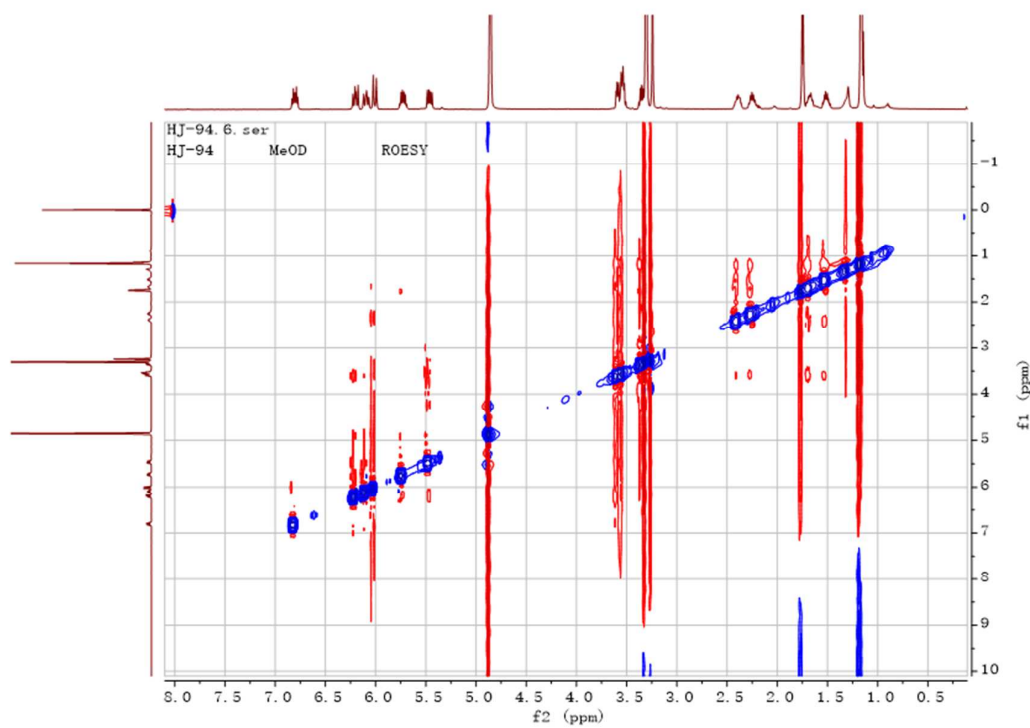


Fig. S12.6 ROESY spectrum (500 MHz) of (±)-ZP-amide N (**10**) in CD₃OD

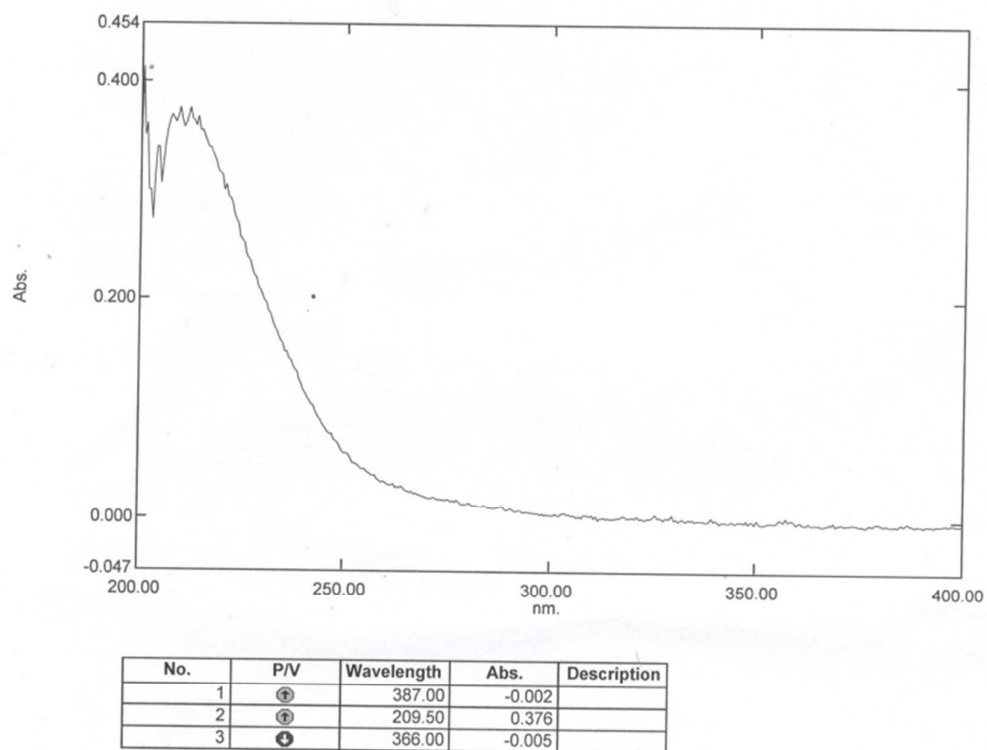


Fig. S12.7 UV spectrum of (±)-ZP-amide N (10)

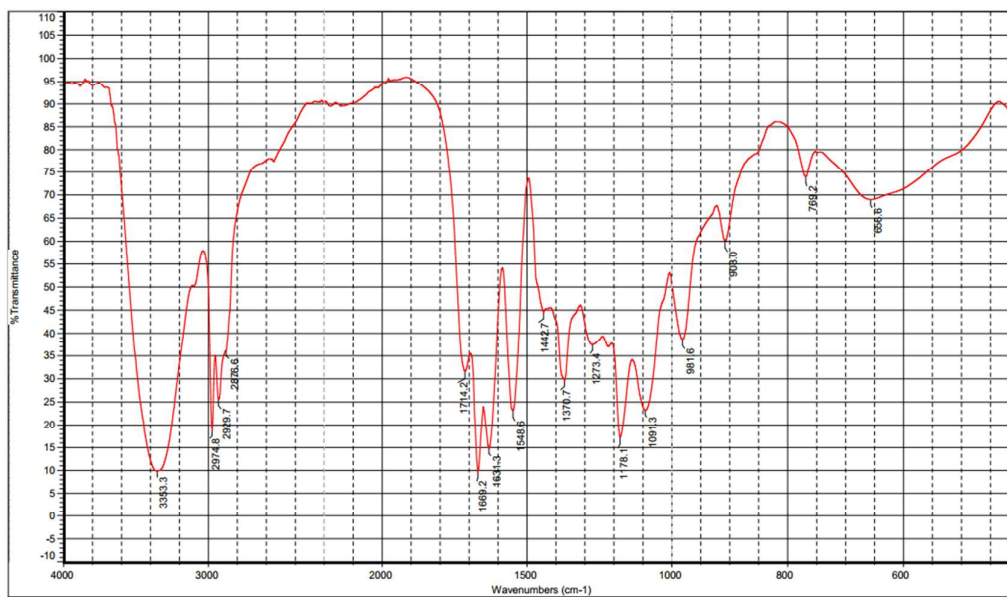


Fig. S12.8 IR spectrum of (±)-ZP-amide N (10)

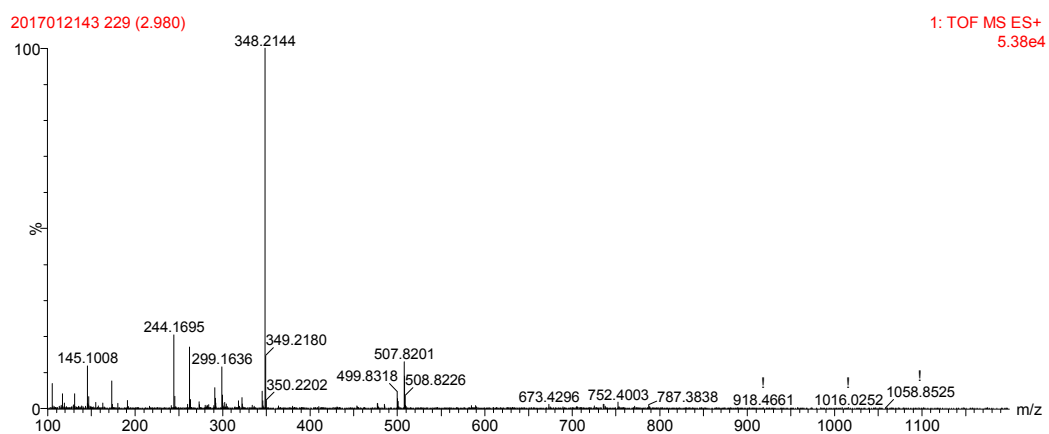


Fig. S12.9 HRESIMS spectrum of (±)-ZP-amide N (**10**)