

Supplementary materials for

**A new approach to synthesis of 4-phenacylidene-flavene derivatives and
their potential cytotoxic effects on HepG2 cell line**

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Figure S1. ESI-MS of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

Figure S2. ^1H NMR of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

Figure S3. ^{13}C NMR of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

Figure S4. ESI-MS of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S5. ^1H NMR of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S5. ^{13}C NMR of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S6. ^1H - ^1H COSY of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S7. HSQC of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S8. HMBC of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

Figure S9. ESI-MS of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

Figure S10. ^1H NMR of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

Figure S11. ^{13}C NMR of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

Figure S12. HSQC of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

Figure S13. HMBC of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

Figure S14. ESI-MS of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S15. ^1H NMR of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S16. ^{13}C NMR of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S17. ^1H - ^1H COSY of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S18. HSQC of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S19. HMBC of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

Figure S20. ESI-MS of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

Figure S21. ^1H NMR of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

Figure S22. ^{13}C NMR of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

Figure S23. ESI-MS of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-

phenyl)-ethanone (**4f**)

Figure S24. ^1H NMR of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-phenyl)-ethanone (**4f**)

Figure S25. ^{13}C NMR of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-phenyl)-ethanone (**4f**)

Figure S26. ESI-MS of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

Figure S27. ^1H NMR of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

Figure S28. ^{13}C NMR of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

Figure S29. The structures of compounds **4a-4g**

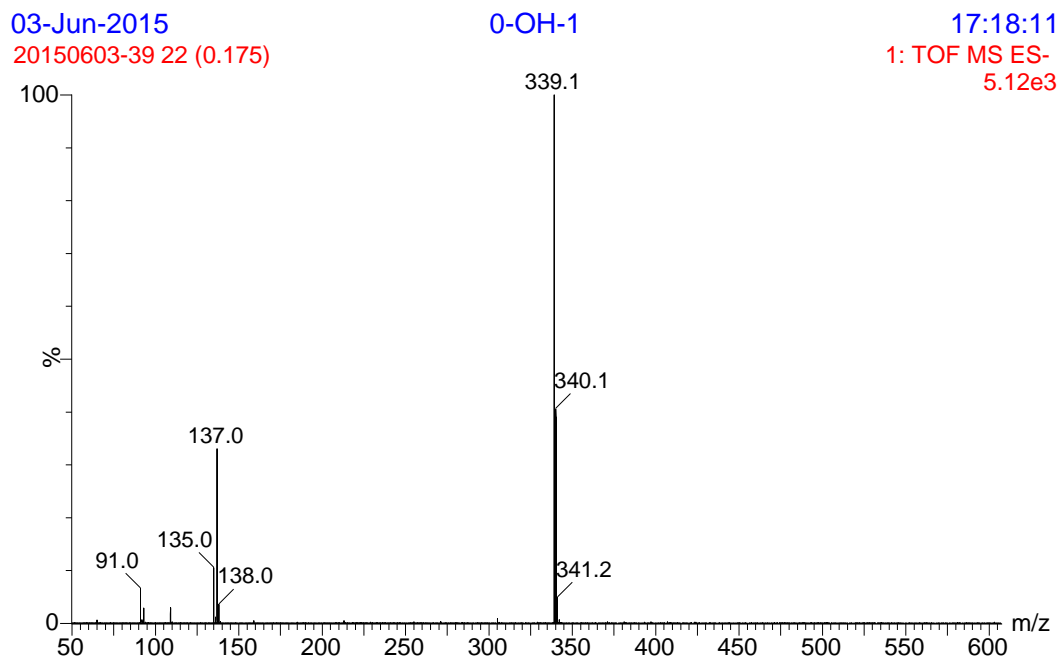


Figure S1. ESI-MS of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

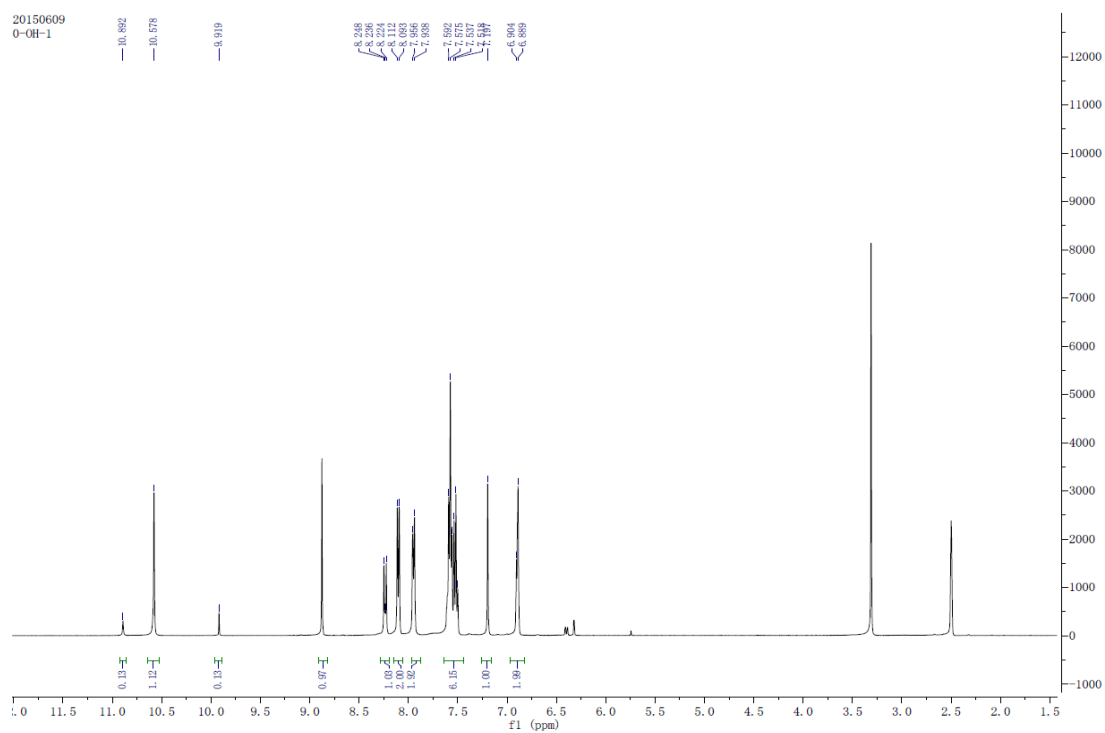


Figure S2. ^1H NMR of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

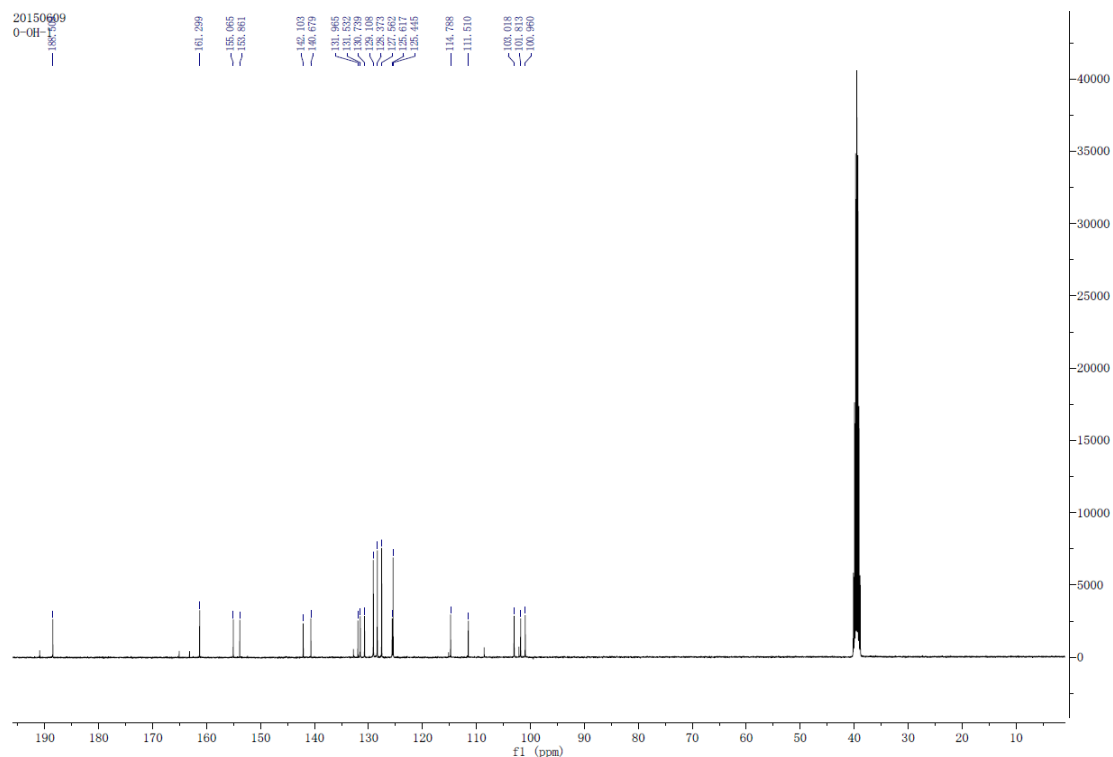


Figure S3. ^{13}C NMR of 2-(7-hydroxy-2-phenyl-chromen-4-ylidene)-1-phenyl-ethanone (**4a**)

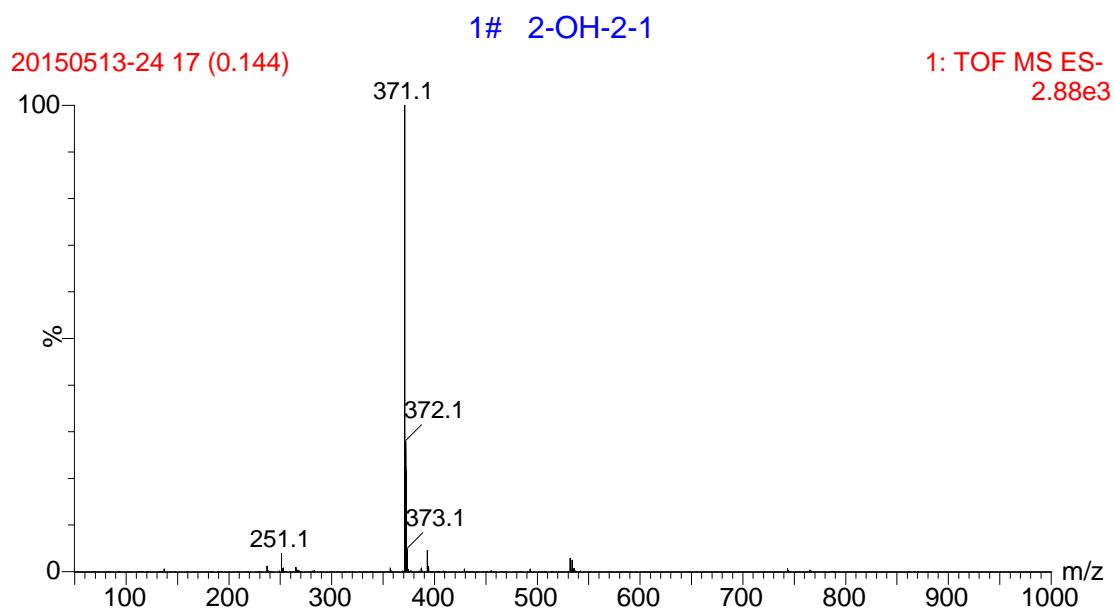


Figure S4. ESI-MS of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

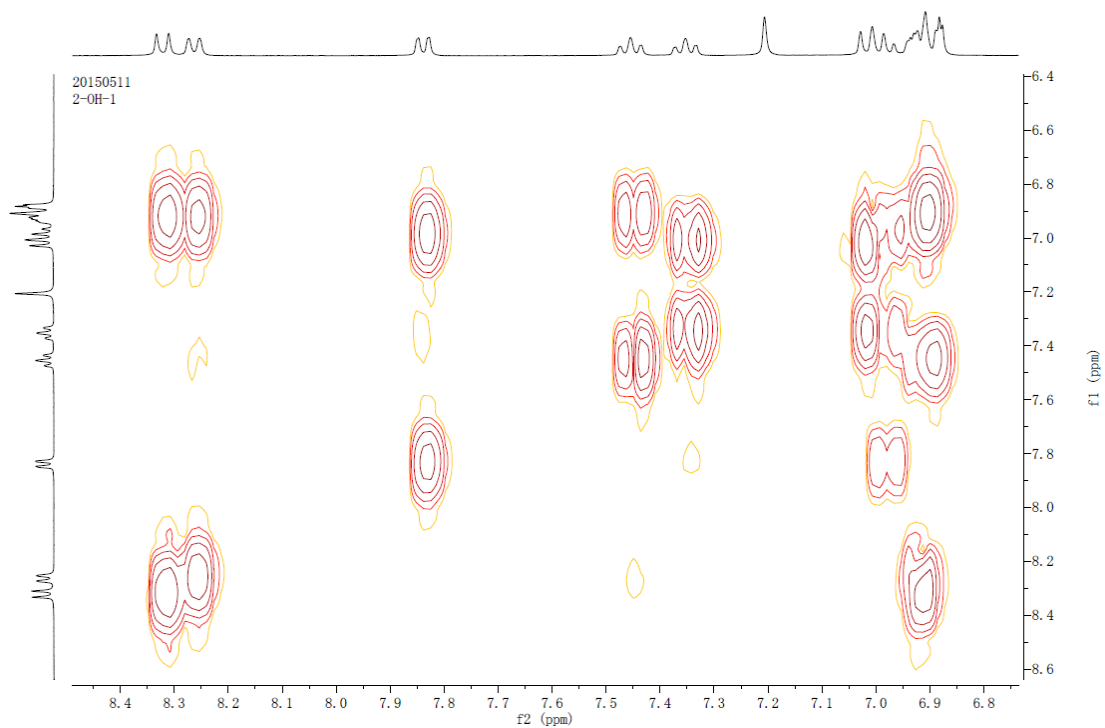


Figure S6. ^1H - ^1H COSY of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

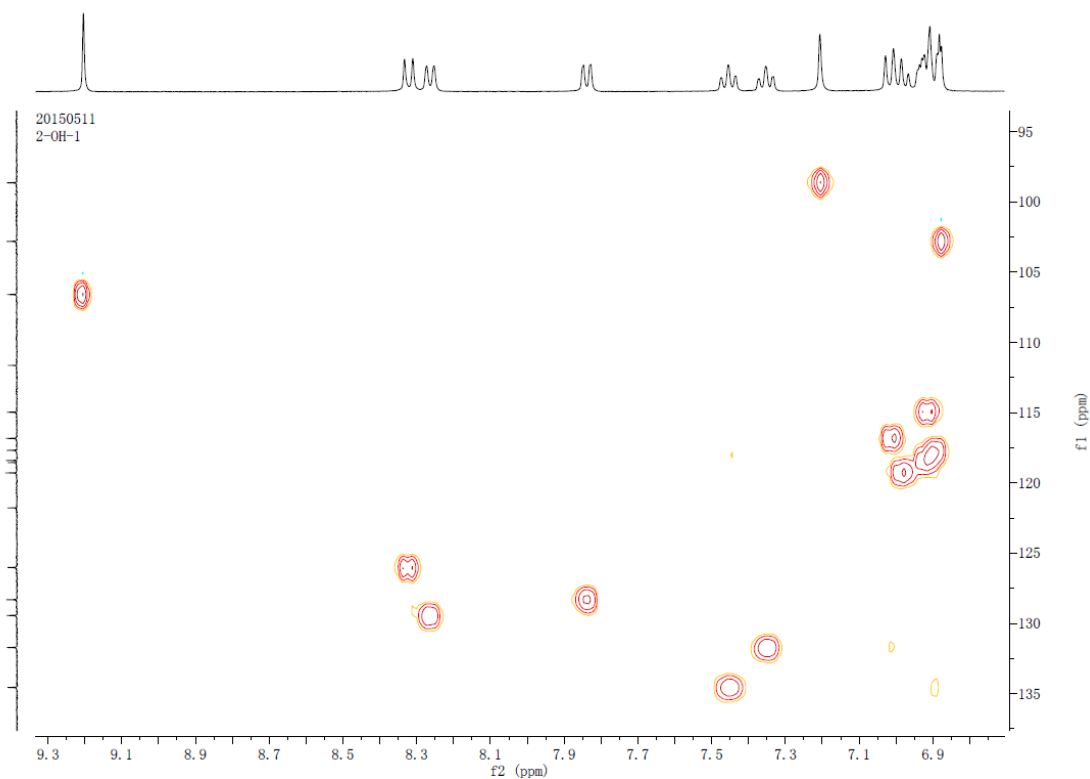


Figure S7. HSQC of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

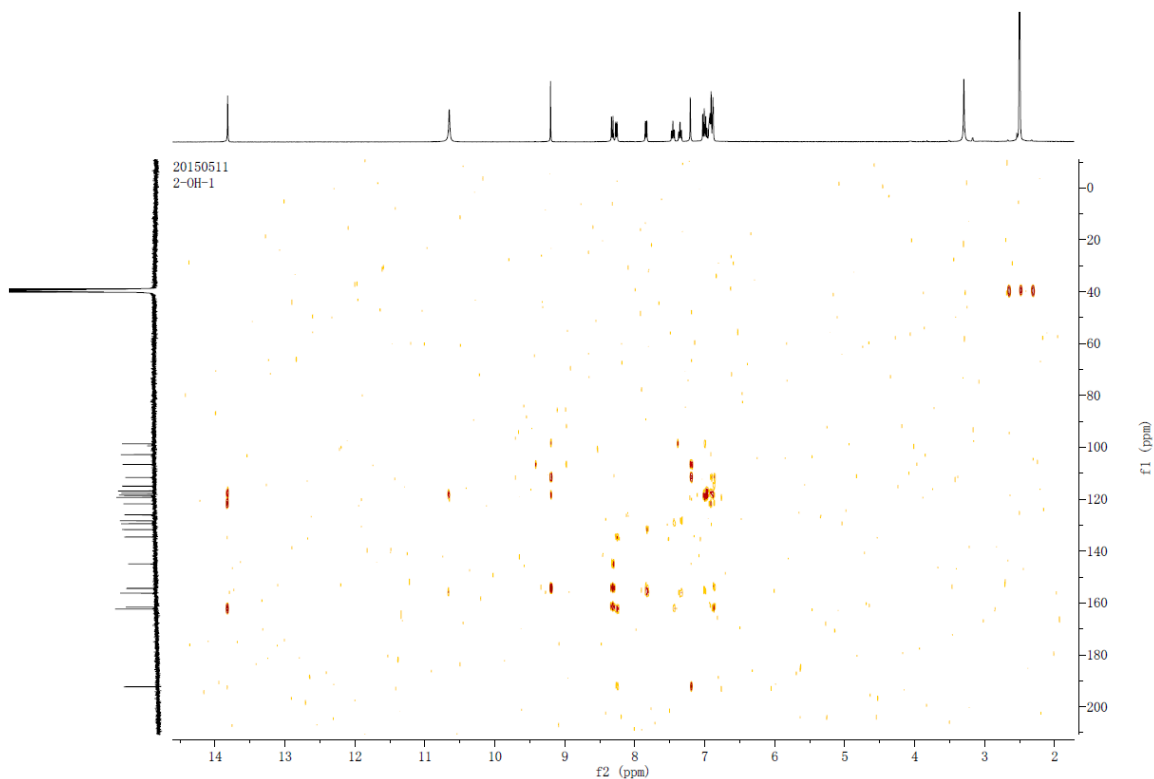


Figure S8. HMBC of 2-[7-hydroxy-2-(2-hydroxy-phenyl)-chromen-4-ylidene]-1-(2-hydroxy-phenyl)-ethanone (**4b**)

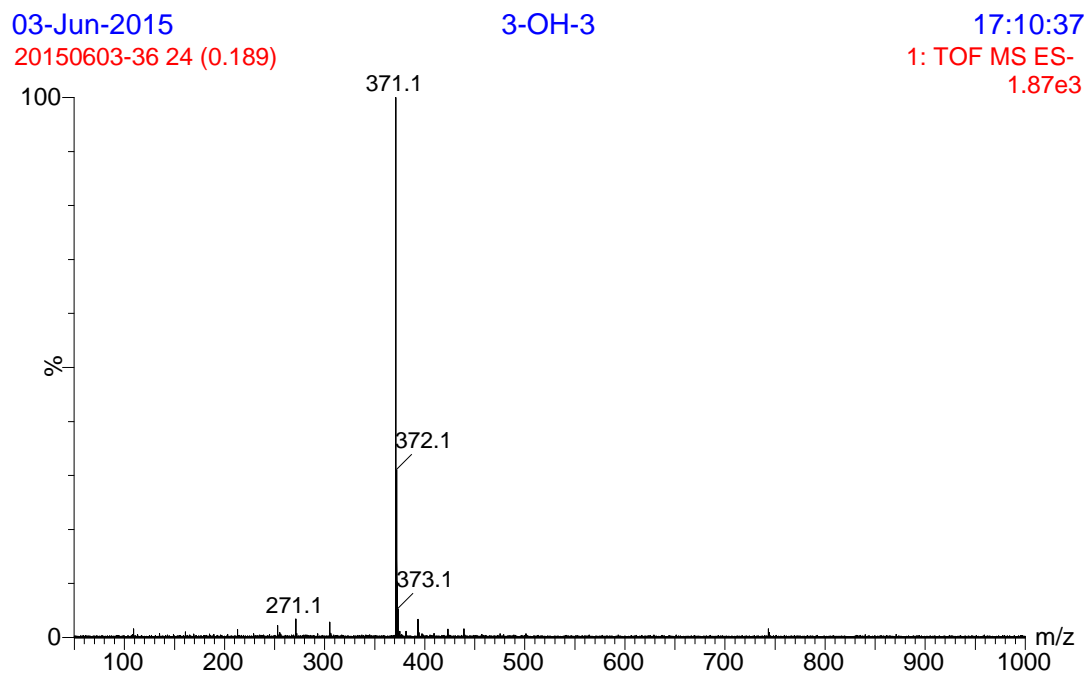


Figure S9. ESI-MS of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

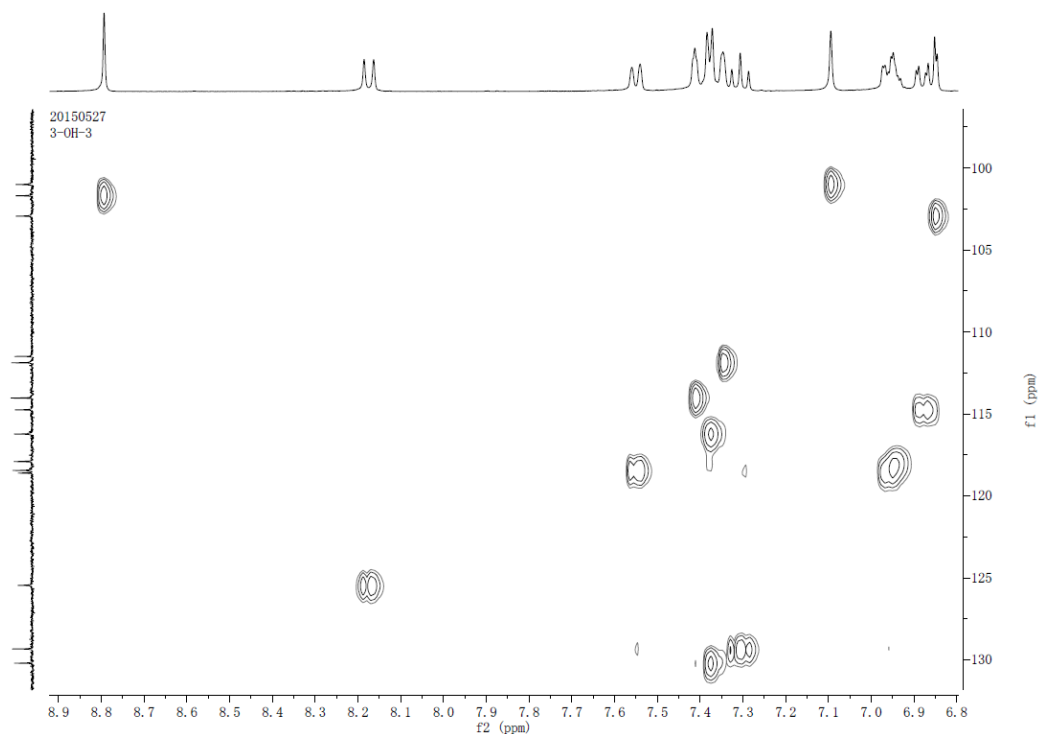


Figure S12. HSQC of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

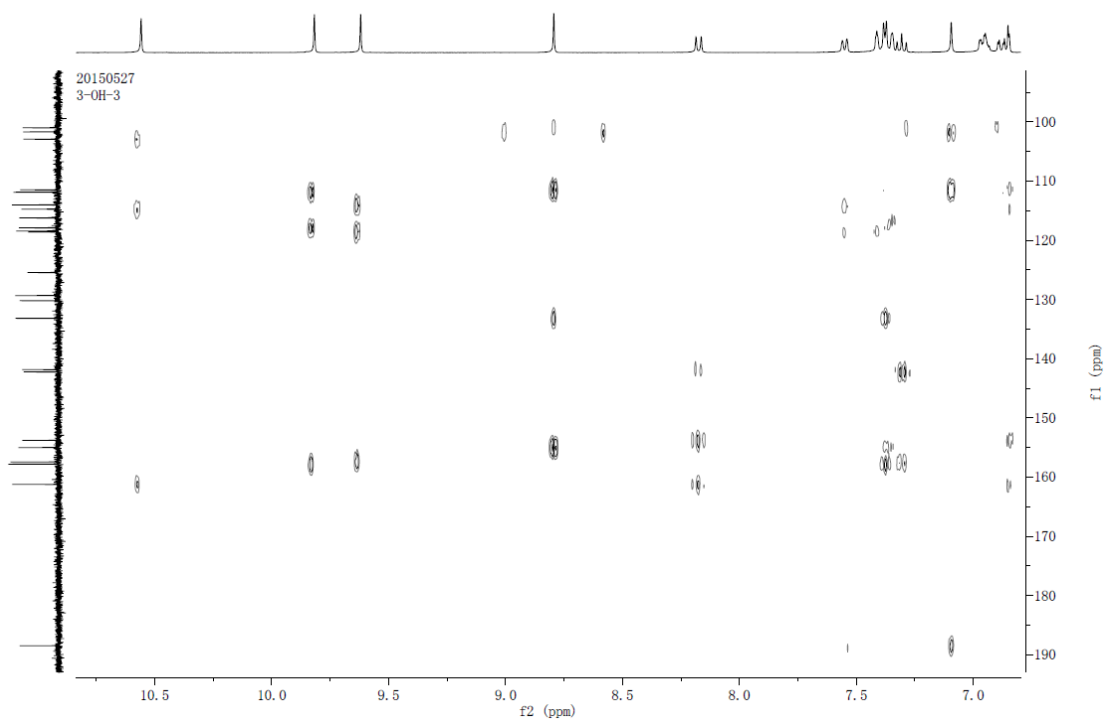


Figure S13. HMBC of 2-[7-hydroxy-2-(3-hydroxy-phenyl)-chromen-4-ylidene]-1-(3-hydroxy-phenyl)-ethanone (**4c**)

25-Jun-2015

20150625-17 17 (0.149)

4-OH-1

16:19:50

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1.43e3

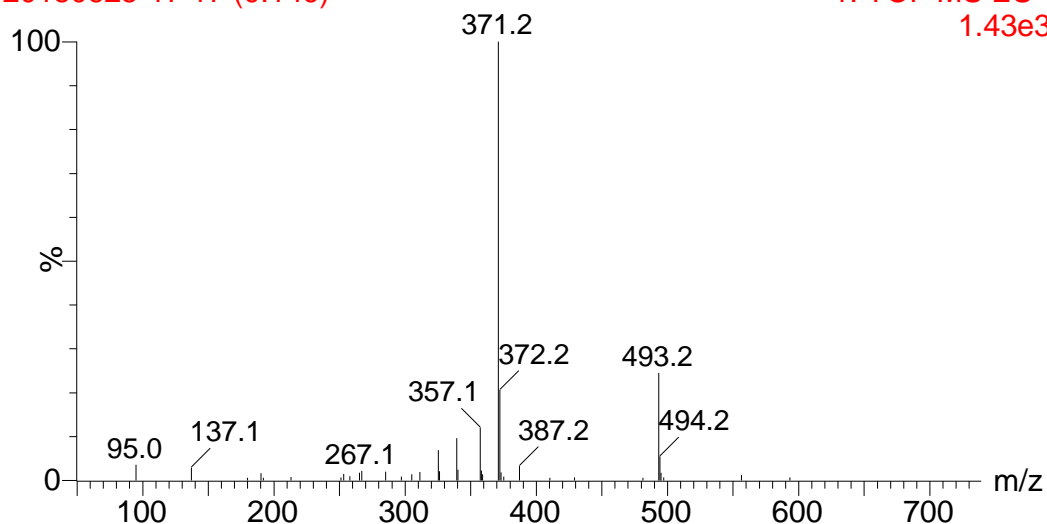


Figure S14. ESI-MS of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

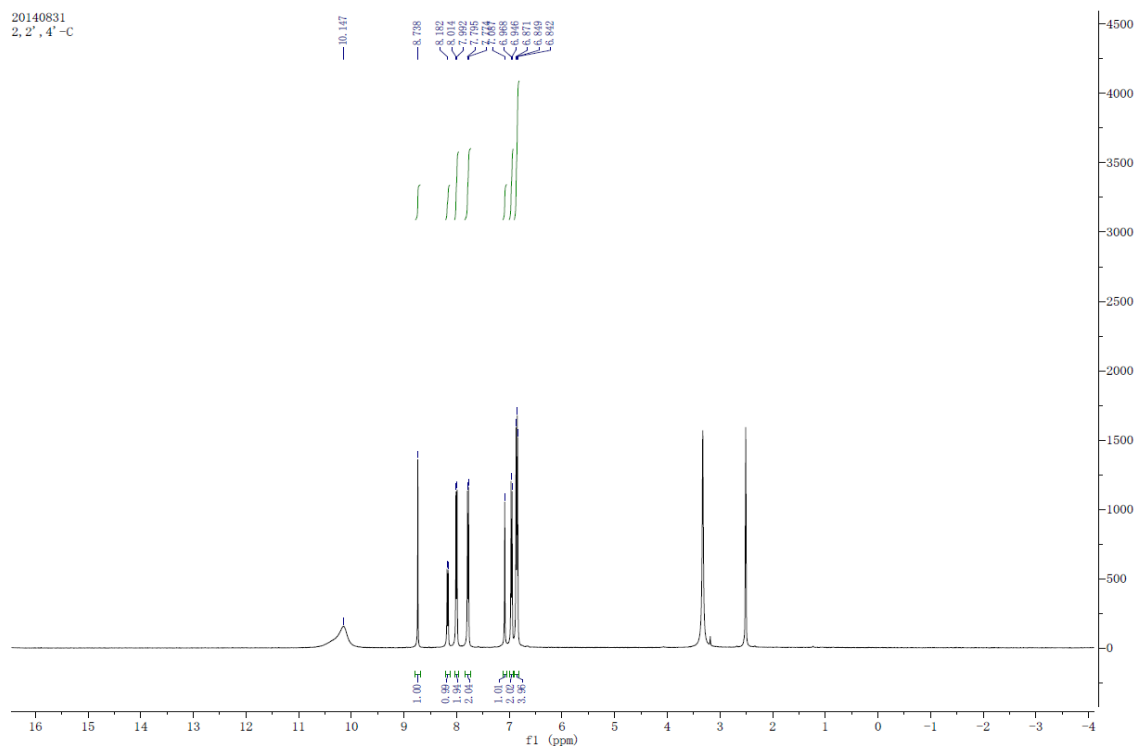


Figure S15. ¹H NMR of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

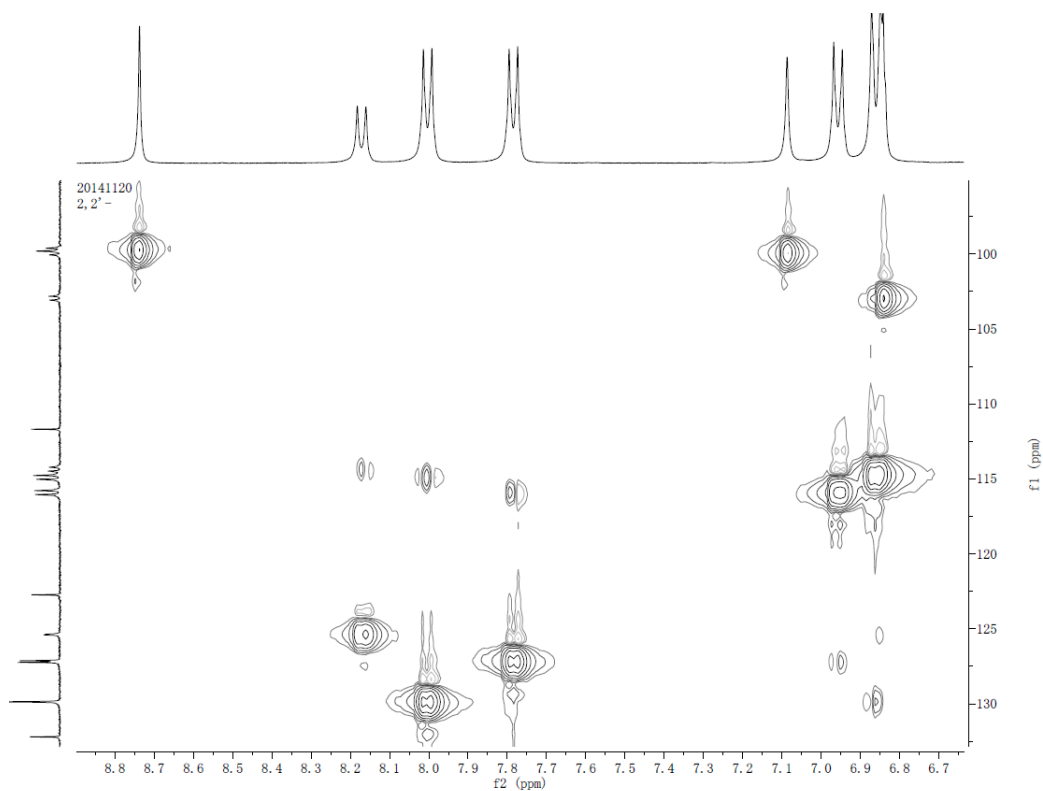


Figure S18. HSQC of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

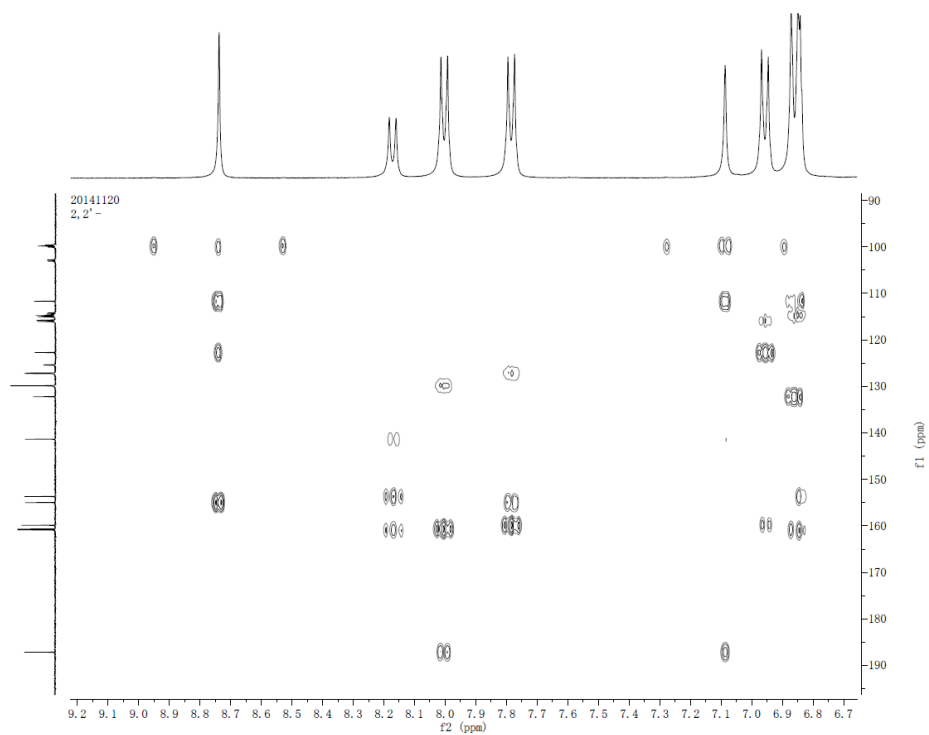


Figure S19. HMBC of 2-[7-hydroxy-2-(4-hydroxy-phenyl)-chromen-4-ylidene]-1-(4-hydroxy-phenyl)-ethanone (**4d**)

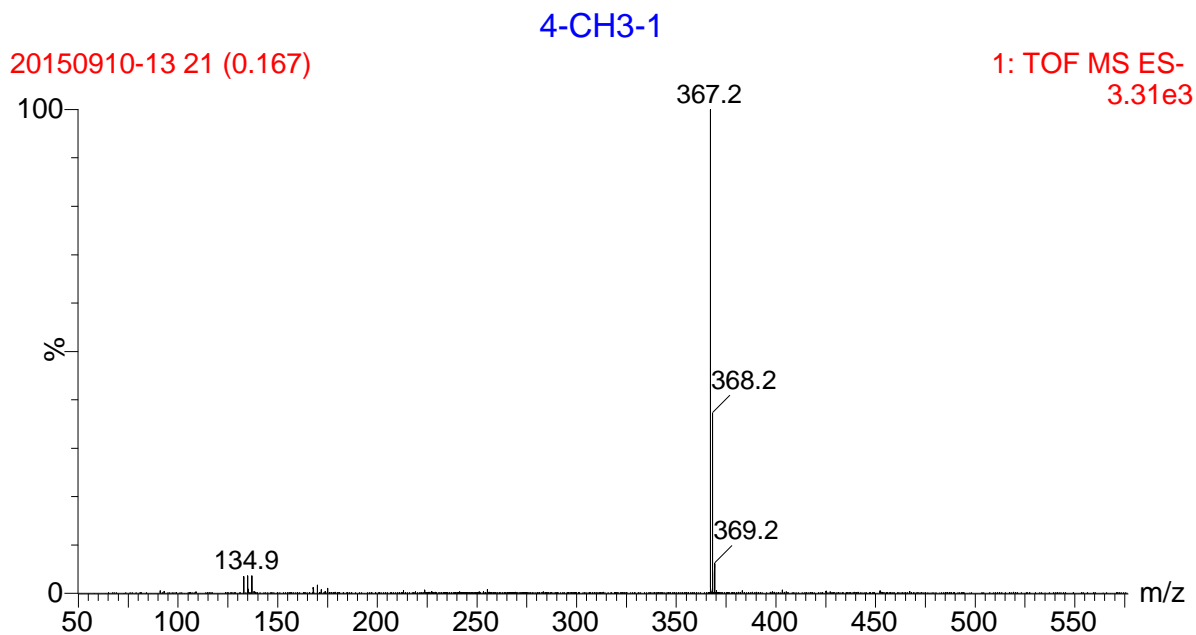


Figure S20. ESI-MS of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

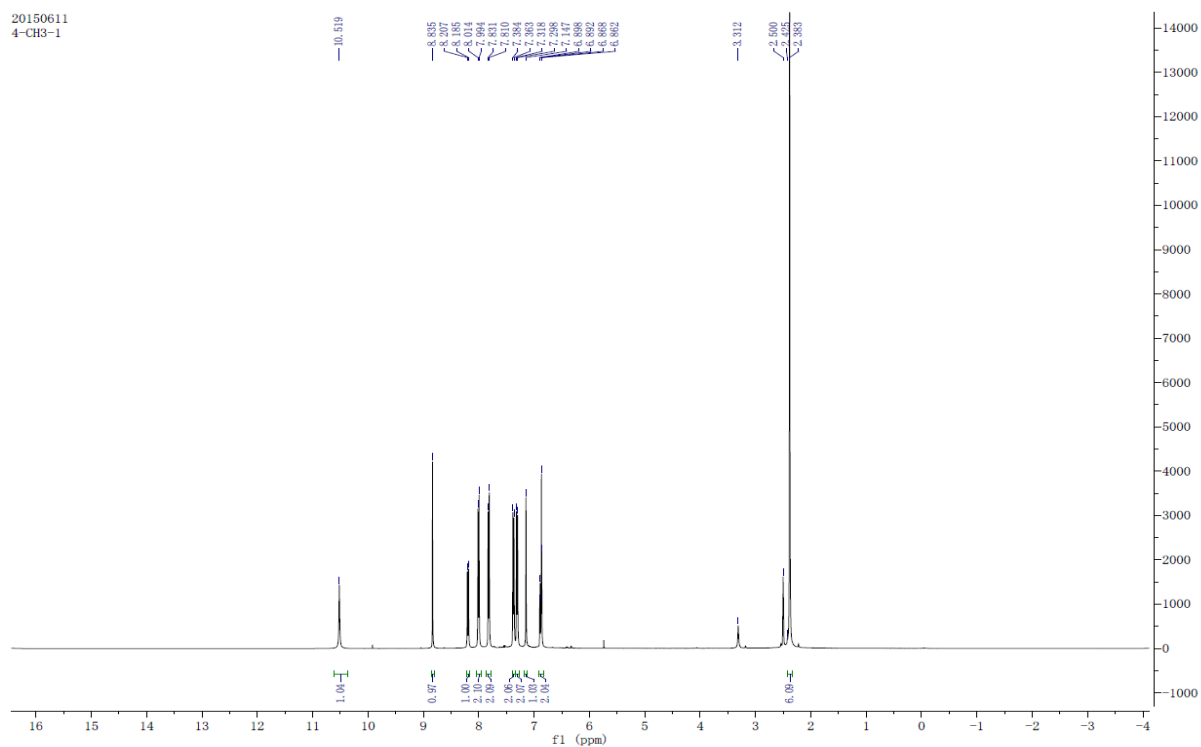


Figure S21. ^1H NMR of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

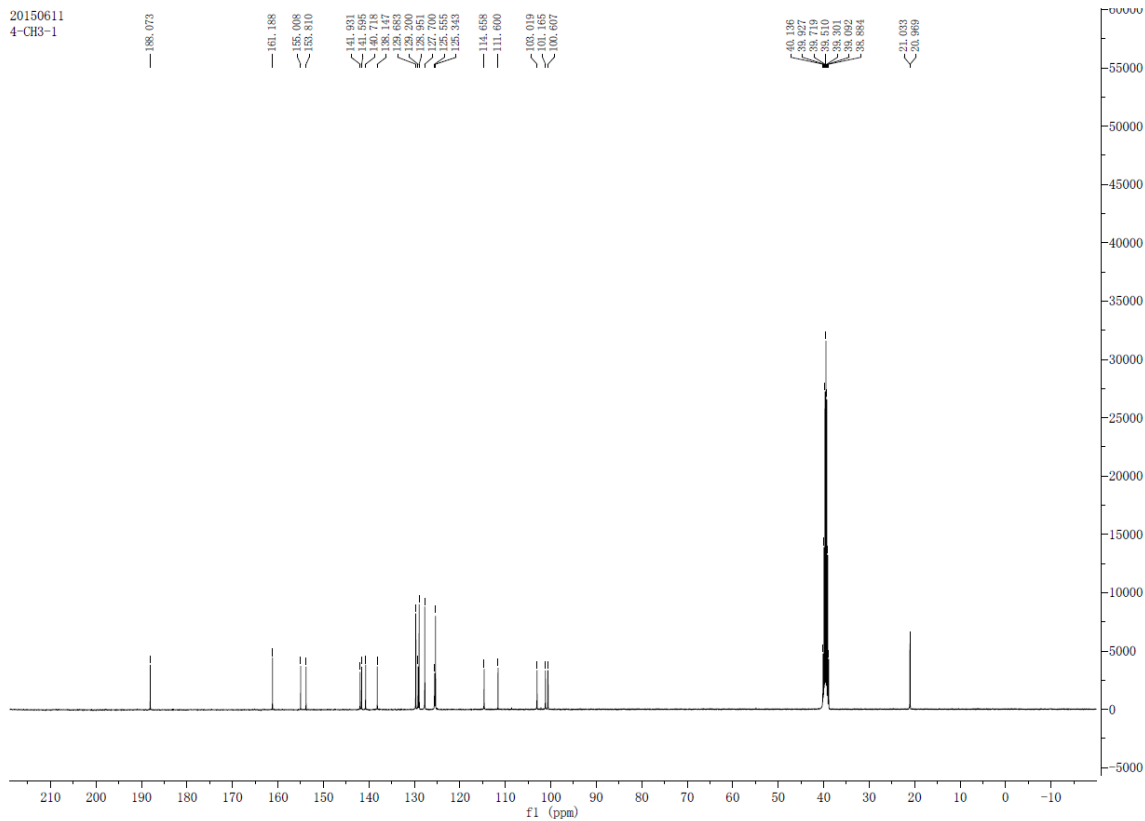


Figure S22. ^{13}C NMR of 2-(7-Hydroxy-2-p-tolyl-chromen-4-ylidene)-1-p-tolyl-ethanone (**4e**)

09-Jun-2015

4-OCH3

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1.50e3

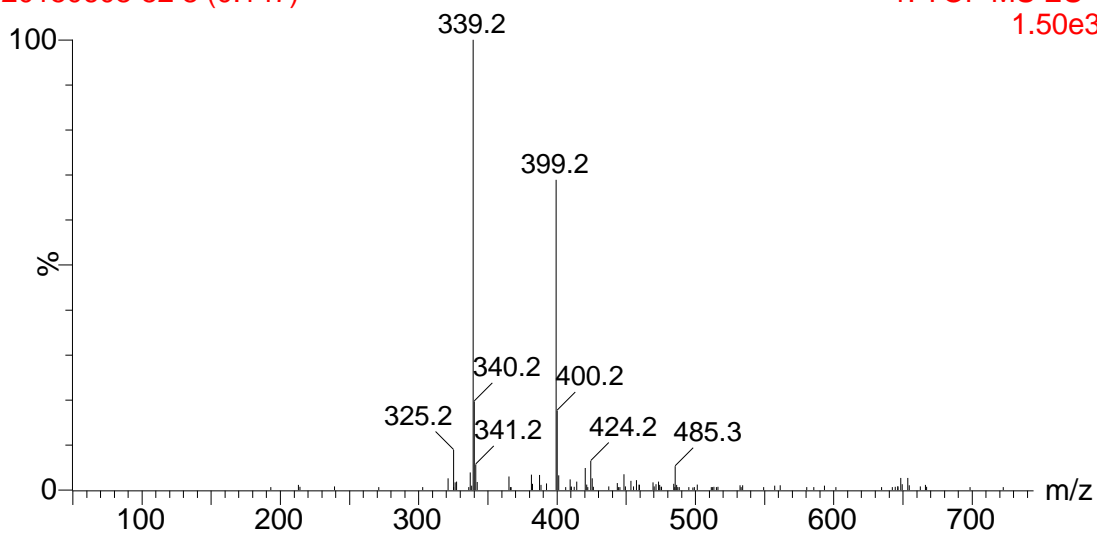


Figure S23. ESI-MS of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-phenyl)-ethanone (**4f**)

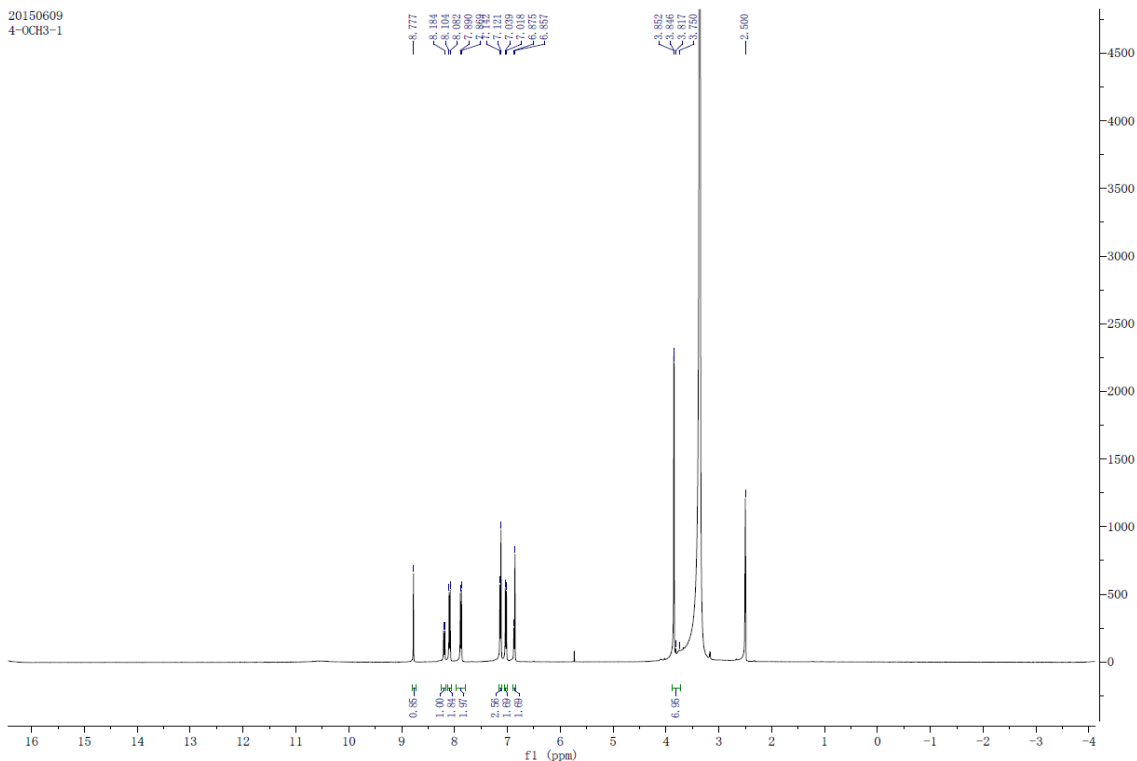


Figure S24. ^1H NMR of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-phenyl)-ethanone (**4f**)

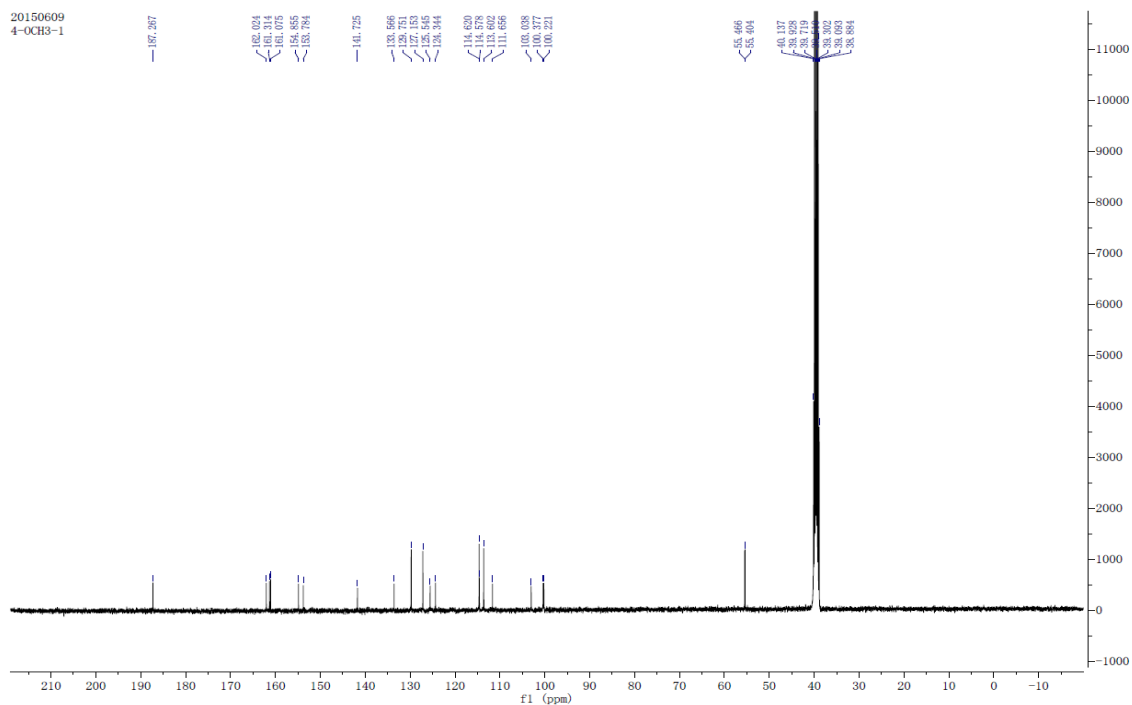


Figure S25. ^{13}C NMR of 2-[7-hydroxy-2-(4-methoxy-phenyl)-chromen-4-ylidene]-1-(4-methoxy-phenyl)-ethanone (**4f**)

25-Jun-2015

4-CL-1

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20150625-12 17 (0.149)

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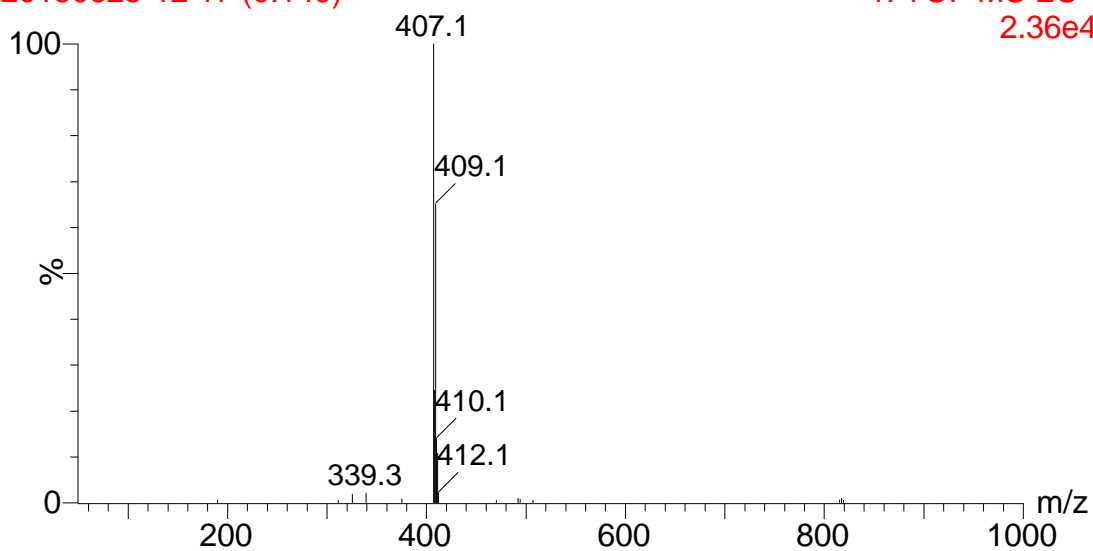


Figure S26. ESI-MS of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

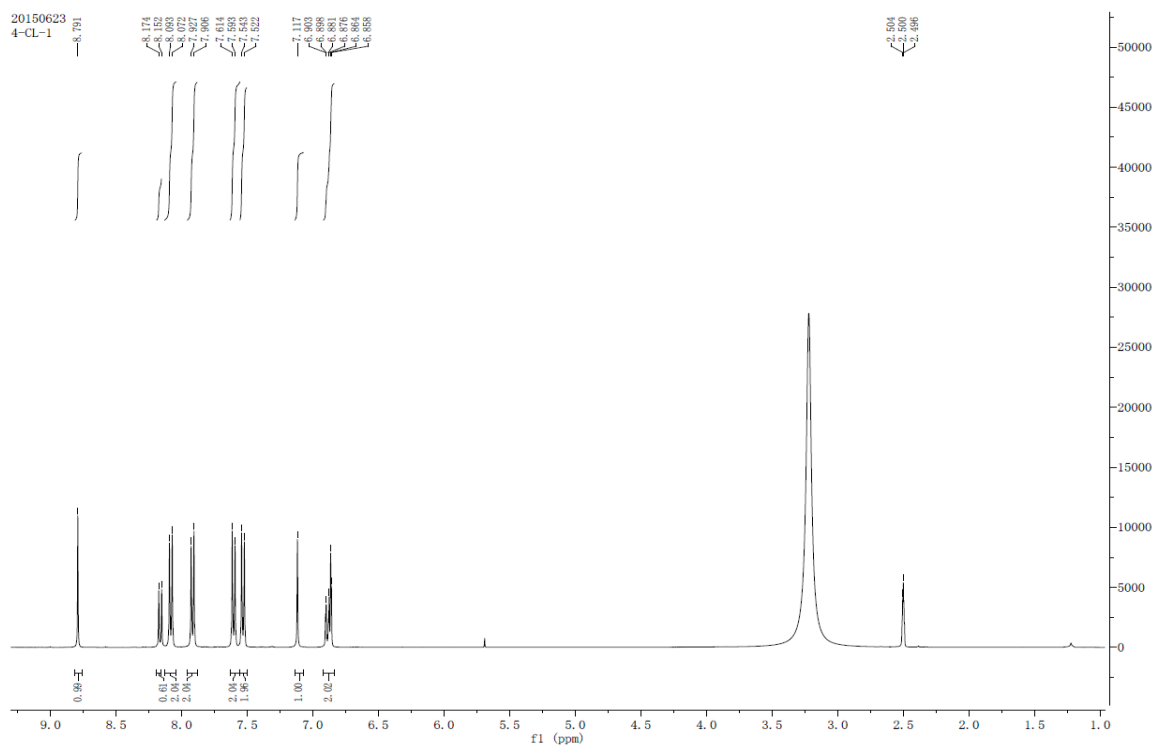


Figure S27. ¹H NMR of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

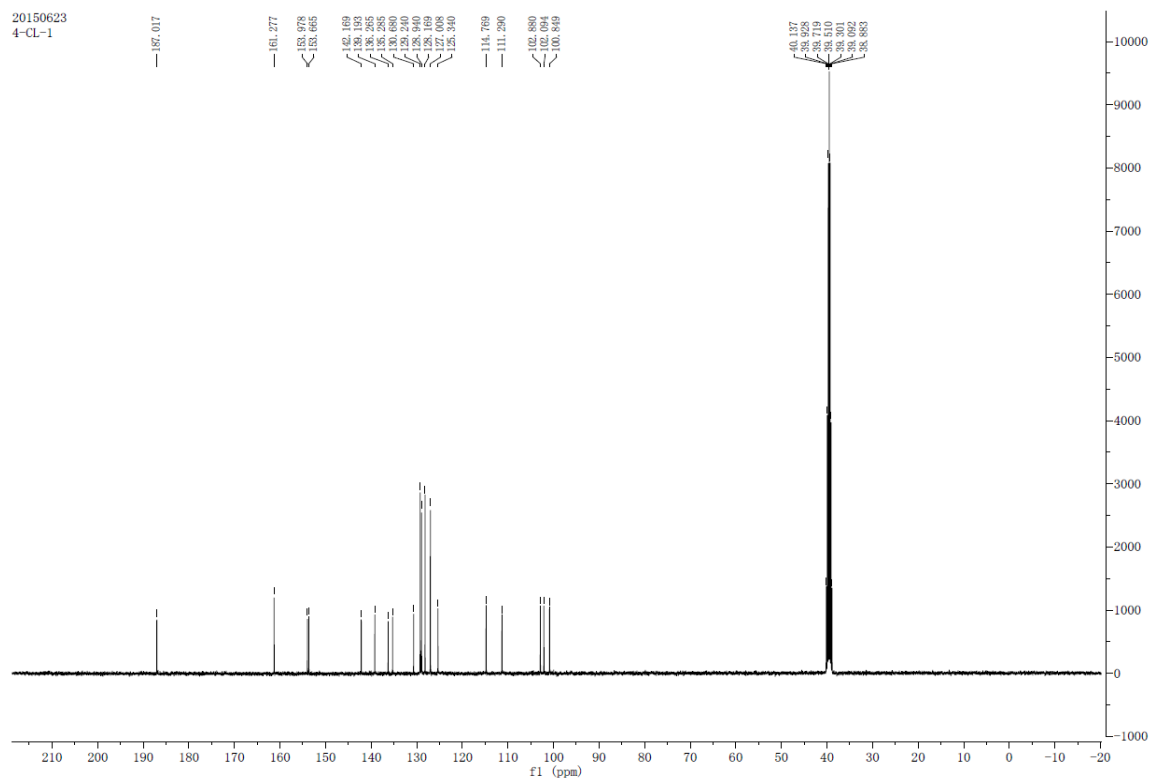


Figure S28. ^{13}C NMR of 1-(4-Chloro-phenyl)-2-[2-(4-chloro-phenyl)-7-hydroxy-chromen-4-ylidene]-ethanone (**4g**)

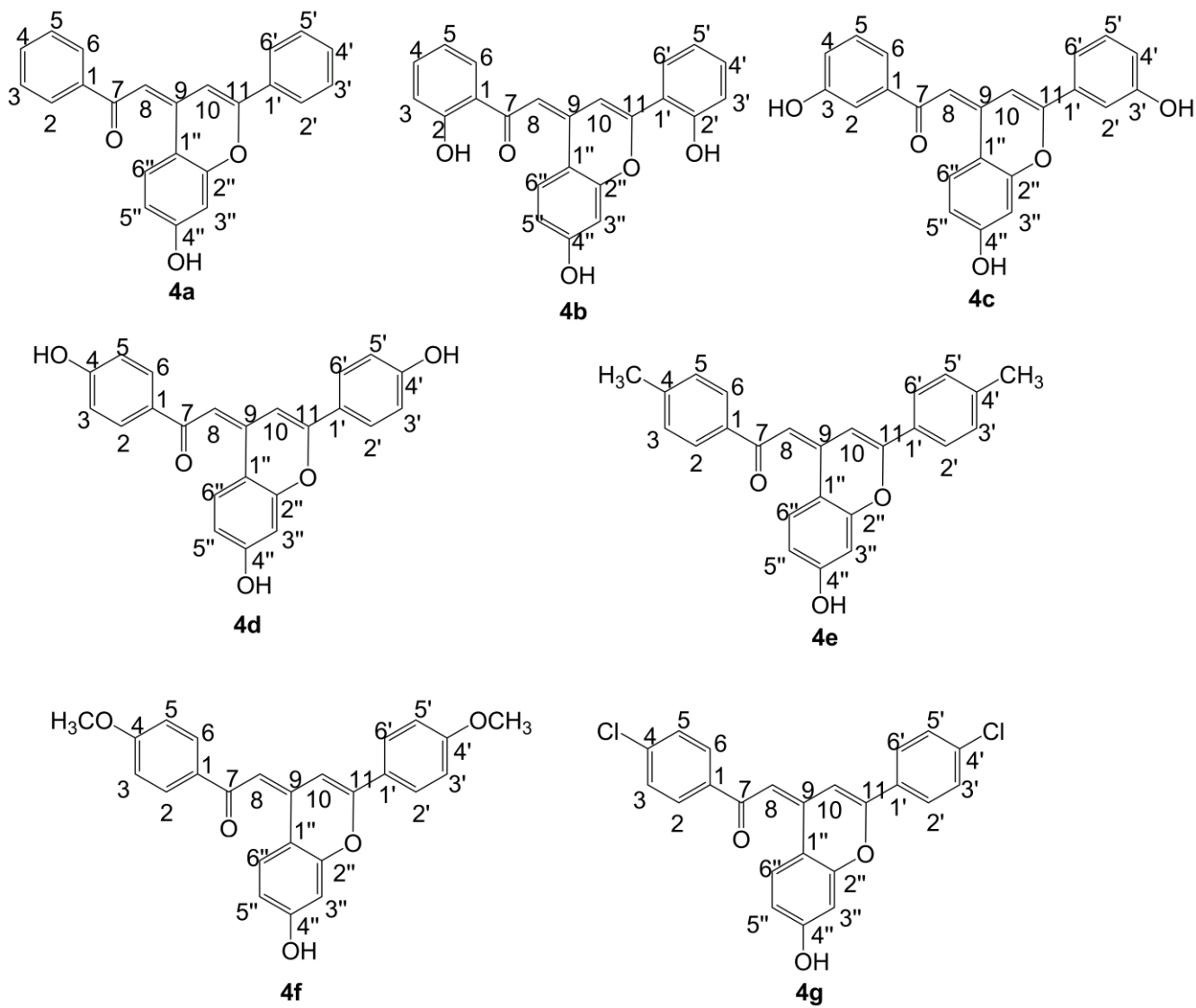


Figure S29. The structures of compounds **4a-4g**