Supporting Materials

Figure 1. 1H NMR (500MHz, DMSO-d6) of 4a	
Figure 2. ¹³ C NMR (125MHz, DMSO- d_6) of 4a	
Figure 3. ¹ H NMR (500MHz, CD_3OD) of 5a	
Figure 4. ¹³ C NMR (125MHz, CD ₃ OD) of $5a$	
Figure 5. ¹⁹ F NMR (475MHz, CD ₃ OD) of 5a	
Figure 6. ¹ H NMR (500MHz, CDCl ₃) of $2b$	
Figure 7. ¹ H NMR (500MHz, CDCl ₃) of $\mathbf{3b}$	
Figure 8. ¹ H NMR (500MHz, CDCl ₃) of 4b	
Figure 9. ¹³ C NMR (125MHz, DMSO- d_6) of 4b	
Figure 10. ¹ H NMR (400MHz, CDCl ₃) of 5b	
Figure 11. ¹³ C NMR (125MHz, CDCl ₃) of 5b	
Figure 12. ¹ H NMR (500MHz, CDCl ₃) of $2c$	
Figure 13. ¹ H NMR (500MHZ, CDCl ₃) of $3c$	
Figure 14. ¹ H NMR (500MHz, CD ₃ OD) of $4c$	S18
Figure 15. ¹ H NMR (500MHz, CDCl ₃) of 5c	S19
Figure 16. ¹³ C NMR (125MH _Z , CDCl ₃) of 5c	
Figure 17. ¹⁹ F NMR (470MH _Z , CDCl ₃) of 5c	S21
Figure 18. ¹ HNMR (500MH _Z , CDCl ₃) of $2d$	
Figure 19. ¹ H NMR (500MH _Z , CDCl ₃ /DMSO-d ₆) of 3d	S23
Figure 20. ¹³ C NMR (125MH _Z , CDCl ₃ /DMSO-d ₆) of 3d	S24
Figure 21. ¹ H NMR (500MH _Z , DMSO-d ₆) of 4d	S25
Figure 22. ¹³ C NMR (125MH _Z , DMSO- d_6) of 4d	
Figure 23. ¹ H NMR (500MH _Z , CDCl ₃) of 5d	
Figure 24. ¹³ C NMR (125MH _Z , CDCl ₃) of 5d	
Figure 25. ¹ H NMR (500MH _Z , CDCl ₃) of $6a$	
Figure 26. ¹³ C NMR (125MH _Z , CDCl ₃) of $6a$	S30
Figure 27. ¹ H NMR (500MH _Z , CDCl ₃) of $7a$	
Figure 28. ¹³ C NMR (125MH _Z , CDCl ₃) of 7a	

Figure 29. ¹⁹ F NMR (470MH _z , CDCl ₃) of $7a$	S33
Figure 30. ¹ H NMR (500MH _Z , CDCl ₃) of 6a'	S34
Figure 31. ¹³ C NMR (125MH _Z , CDCl ₃) of 6a '	S35
Figure 32. ¹ H NMR (500MH _Z , CDCl ₃) of $7a'$	S36
Figure 33. ¹³ C NMR (125MH _Z , CDCl ₃) of 7a '	S37
Figure 34. ¹⁹ F NMR (470MH _z , CDCl ₃) of $7a'$	S38
Figure 35. ¹ H NMR (500MH _Z , CDCl ₃) of 6b	S39
Figure 36. ¹³ C NMR (125MH _Z , CDCl ₃) of 6b	S40
Figure 37. ¹ H NMR (500MH _Z , CDCl ₃) of 7b	S41
Figure 38. ¹³ C NMR (125MH _Z , CD ₃ OD) of 7b	S42
Figure 39. ¹ H NMR (500MH _Z , CDCl ₃) of 6b'	S43
Figure 40. ¹³ C NMR (125 MH_Z , CDCl ₃) of 6b'	S44
Figure 41. ¹ H NMR (500MH _Z , CDCl ₃) of 7b'	S45
Figure 42. ¹³ C NMR (125MH _Z , CDCl ₃) of 7b'	S46
Figure 43. ¹ H NMR (500MH _Z , CDCl ₃) of 6c	S47
Figure 44. ¹³ C NMR (125MH _Z , CDCl ₃) of $6c$	S48
Figure 45. ¹ H NMR (500MH _Z , CDCl ₃) of $7c$	S49
Figure 46. ¹³ C NMR (125MH _Z , CDCl ₃) of $7c$	S50
Figure 47. ¹⁹ F NMR (470MH _z , CDCl ₃) of $7c$	S51
Figure 48. ¹ H NMR (500MH _Z , CDCl ₃) of 6d	S52
Figure 49. ¹³ C NMR (125 MH_Z , CDCl ₃) of 6d	S53
Figure 50. ¹ H NMR (500MH _Z , CDCl ₃) of $7d$	S54
Figure 51. ¹³ C NMR (125MH _Z , CDCl ₃) of $7d$	S55
Figure 52. ¹ H NMR (500MH _Z , CDCl ₃) of 6e	S56
Figure 53. ¹³ C NMR (125MH _Z , CDCl ₃) of 6e	S57
Figure 54. ¹ H NMR (500MH _Z , CDCl ₃) of $7e$	S58
Figure 55. ¹³ C NMR (125MH _Z , CDCl ₃) of $7e$	S59
Figure 56. ¹⁹ F NMR (470MH _Z , CDCl ₃) of $7e$	S60
Figure 57. ¹ H NMR (500MH _Z , CDCl ₃) of 6e'	S61
Figure 58. ¹³ C NMR (125MH _Z , CDCl ₃) of 6e'	S62

Figure 59. ¹ H NMR (500MH _Z , CDCl ₃) of $7e^{2}$	S63
Figure 60. ¹³ C NMR (125MH _Z , CDCl ₃) of 7e'	
Figure 61. ¹⁹ F NMR (470MH _Z , CDCl ₃) of 7e'	
Figure 62. ¹ H NMR (500MH _Z , CDCl ₃) of 6f	
Figure 63. ¹³ C NMR (125MH _Z , CDCl ₃) of 6f	
Figure 64. ¹ H NMR (500MH _Z , CDCl ₃) of 7f	
Figure 65. ¹³ C NMR (125MH _Z , CDCl ₃) of 7f	
Figure 66. ¹ H NMR (500MH _Z , CDCl ₃) of 6f'	
Figure 67. ¹³ C NMR (125MH _Z , CDCl ₃) of 6f ^{$*$}	
Figure 68. ¹ H NMR (500MH _Z , CDCl ₃) of 7f'	
Figure 69. ¹³ C NMR (125MH _Z , CDCl ₃) of 7f ^{\cdot}	
Figure 70. ¹ H NMR (500MHz, DMSO-d6) of 2B	
Figure 71. ¹ H NMR (500MHz, DMSO-d6) of 3B	
Figure 72. ¹ H NMR (500MHz, DMSO-d6) of 4B	
Figure 73. ¹³ C NMR (125MHz, DMSO-d6) of 4B	
Figure 74. ¹ H NMR (500MHz, CDCl ₃) of 5B	
Figure 75. ¹³ C NMR (125MHz, CDCl ₃) of 5B	
Figure 76. ¹ H NMR (500MHz, CDCl ₃) of 2E	
Figure 77. ¹⁹ F NMR (470MHz, CDCl ₃) of 2E	
Figure 78. ¹ H NMR (500MHz, CDCl ₃) of 3E	
Figure 79. ¹ H NMR (500MHz, CDCl ₃) of 4E	
Figure 80. ¹³ C NMR (125MHz, CDCl ₃) of 4E	
Figure 81. ¹ H NMR (500MHz, CDCl ₃) of 5 E	
Figure 82. ¹³ C NMR (125MHz, CDCl ₃) of 5 E	
Figure 83. ¹⁹ F NMR (470MHz, CDCl ₃) of 5 E	
Figure 84. ¹ H NMR (500MHz, CDCl ₃) of $2F$	
Figure 85. ¹ H NMR (500MHz, $CDCl_3$) of 3F	
Figure 86. ¹ H NMR (500MHz, DMSO-d6) of 4F .	
Figure 87. ¹³ C NMR (125MHz, DMSO-d6) of 4F	
Figure 88. ¹ H NMR (500MHz, CDCL ₃) of 5 F	

Figure 89. 13 C NMR (125MHz, CDCL ₃) of 5 F	S93
Figure 91. ¹³ C NMR (125MHz, CDCL ₃) of 6B	S95
Figure 92. ¹ H NMR (500MHz, CDCL ₃) of 7B	S96
Figure 93. ¹³ C NMR (125MHz, CDCL ₃) of 7B	S97
Figure 94. ¹ H NMR (500MHz, CDCL ₃) of 6B'	S98
Figure 95. ¹³ C NMR (125MHz, CDCL ₃) of 6B'	S99
Figure 96. ¹ H NMR (500MHz, CDCL ₃) of 7B'	. S100
Figure 97. ¹³ C NMR (125MHz, CDCL ₃) of 7B'	S101
Figure 98. ¹ H NMR (500MHz, CDCL ₃) of 6E	S102
Figure 99. ¹³ C NMR (125MHz, CDCL ₃) of 6 E	S103
Figure 100. ¹⁹ F NMR (470MHz, CDCL ₃) of 6 E	S104
Figure 101. ¹ H NMR (500MHz, CDCL ₃) of 7E	S105
Figure 102. ¹³ C NMR (125MHz, CDCL ₃) of 7E	S106
Figure 103. ¹⁹ F NMR (470MHz, CDCL ₃) of 7E	. S107
Figure 104. ¹ H NMR (500MHz, CDCL ₃) of 6E'	. S108
Figure 105. ¹³ C NMR (125MHz, CDCL ₃) of 6E'	. S109
Figure 106. ¹⁹ F NMR (470MHz, CDCL ₃) of 6E'	S110
Figure 107. ¹ H NMR (500MHz, CDCL ₃) of 7E'	. S 111
Figure 108. ¹³ C NMR (125MHz, CDCL ₃) of 7E'	S112
Figure 109. ¹⁹ F NMR (470MHz, CDCL ₃) of 7E'	S113
Figure 110. ¹ H NMR (500MHz, CDCL ₃) of $\mathbf{6F}$	S114
Figure 111. ¹³ C NMR (125MHz, CDCL ₃) of 6F	S115
Figure 112. ¹ H NMR (500MHz, CDCL ₃) of $7F$. S116
Figure 113. ¹³ C NMR (125MHz, CDCL ₃) of 7F	. S117
Figure 114. ¹ H NMR (500MHz, CDCL ₃) of $6F'$. S118
Figure 115. ¹³ C NMR (125MHz, CDCL ₃) of 6F'	. S119
Figure 116. ¹ H NMR (500MHz, CDCL ₃) of 7F'	. S120
Figure 117. ¹³ C NMR (125MHz, CDCL ₃) of 7F'	. S121



Figure 1. 1H NMR (500MHz, DMSO-d6) of 4a



Figure 2. ¹³C NMR (125MHz, DMSO-d₆) of **4a**.



Figure 3. ¹H NMR (500MHz, CD₃OD) of **5a**



Figure 4.¹³C NMR (125MHz, CD₃OD) of **5a**



Figure 5. ¹⁹F NMR (475MHz, CD₃OD) of **5a**



Figure 6.¹H NMR (500MHz, CDCl₃) of **2b**



Figure 7.¹H NMR (500MHz, CDCl₃) of **3b**



Figure 8.¹H NMR (500MHz, CDCl₃) of **4b**



Figure 9.¹³C NMR (125MHz, DMSO-d₆) of **4b**



Figure 10.¹H NMR (400MHz, CDCl₃) of **5b**



Figure 11.¹³C NMR (125MHz, CDCl₃) of **5b**



Figure 12.¹H NMR (500MHz, CDCl₃) of **2c**





Figure 14.¹H NMR (500MHz, CD₃OD) of **4c**



Figure 15.¹H NMR (500MHz, CDCl₃) of **5c**



Figure 16.¹³C NMR (125MH_Z, CDCl₃) of **5c**



Figure 17.¹⁹F NMR (470MH_Z, CDCl₃) of 5c



Figure 18.¹HNMR (500MH_Z, CDCl₃) of 2d



Figure 19. ¹H NMR (500MH_Z, CDCl₃/DMSO-d₆) of 3d



Figure 20. ¹³C NMR (125MH_Z, CDCl₃/DMSO-d₆) of **3d**



Figure 21.¹H NMR (500MH_Z, DMSO-d₆) of 4d



Figure 22. 13 C NMR (125MH_Z, DMSO-d₆) of 4d



Figure 23.¹H NMR (500MH_Z, CDCl₃) of **5d**



2.04

7.0

6.5

5.5

6.0

5.0

7.5

2.00

8.0



Figure 25.¹H NMR (500MH_Z, CDCl₃) of **6a**

4.0

2.06

4.5

1.84

3.5

3.0

1.87

2.0

1.5

1.0

0.5

ppm

2.5



Figure 26.¹³C NMR (125MH_Z, CDCl₃) of **6a**



Figure 27.¹H NMR (500MH_Z, CDCl₃) of **7a**



Figure 28.¹³C NMR (125MH_Z, CDCl₃) of 7a



Figure 29.¹⁹F NMR (470MH_Z, CDCl₃) of **7a**



Figure 30.¹H NMR (500MH_Z, CDCl₃) of **6a'**



Figure 31.¹³C NMR (125MH_Z, CDCl₃) of **6a'**



Figure 32.¹H NMR (500MH_Z, CDCl₃) of 7a'


Figure 33.¹³C NMR (125MH_Z, CDCl₃) of **7a'**







Figure 35.¹H NMR (500MH_Z, CDCl₃) of **6b**



Figure 36.¹³C NMR (125MH_Z, CDCl₃) of **6b**



Figure 37.¹H NMR (500MH_Z, CDCl₃) of **7b**



Figure 38.¹³C NMR (125MH_Z, CD₃OD) of 7b



Figure 39. ¹H NMR (500MH_Z, CDCl₃) of **6b'**



Figure 40.¹³C NMR (125MH_Z, CDCl₃) of **6b'**



Figure 41.¹H NMR (500MH_z, CDCl₃) of **7b'**



Figure 42.¹³C NMR (125MH_Z, CDCl₃) of **7b'**



Figure 43.¹H NMR (500MH_Z, CDCl₃) of 6c



Figure 44.¹³C NMR (125MH_Z, CDCl₃) of **6c**



Figure 45.¹H NMR (500MH_Z, CDCl₃) of **7c**



Figure 46.¹³C NMR (125MH_Z, CDCl₃) of 7c



Figure 47.¹⁹F NMR (470MH_Z, CDCl₃) of 7c



Figure 48.¹H NMR (500MH_Z, CDCl₃) of **6d**



Figure 49.¹³C NMR (125MH_Z, CDCl₃) of 6d



Figure 50.¹H NMR (500MH_Z, CDCl₃) of **7d**



Figure 51.¹³C NMR (125MH_Z, CDCl₃) of 7d



Figure 52.¹H NMR (500MH_Z, CDCl₃) of **6e**



Figure 53.¹³C NMR (125MH_Z, CDCl₃) of **6e**



Figure 54.¹H NMR (500MH_Z, CDCl₃) of **7e**



Figure 55. ¹³C NMR (125MH_Z, CDCl₃) of **7e**



Figure 56. ¹⁹F NMR (470MH_Z, CDCl₃) of 7e



Figure 57.¹H NMR (500MH_Z, CDCl₃) of **6e'**



Figure 58.¹³C NMR (125MH_Z, CDCl₃) of **6e'**



Figure 59.¹H NMR (500MH_Z, CDCl₃) of **7e'**



Figure 60.¹³C NMR (125MH_Z, CDCl₃) of **7e'**



Figure 61. ¹⁹F NMR (470MH_Z, CDCl₃) of $7e^{3}$



Figure 62.¹H NMR (500MH_Z, CDCl₃) of **6f**



Figure 63.¹³C NMR (125MH_z, CDCl₃) of **6f**



Figure 64.¹H NMR (500MH_Z, CDCl₃) of 7f



Figure 65.¹³C NMR (125MH_z, CDCl₃) of **7f**



Figure 66.¹H NMR (500MH_Z, CDCl₃) of **6f**'



Figure 67.¹³C NMR (125MH_Z, CDCl₃) of **6f**'



Figure 68.¹H NMR (500MH_Z, CDCl₃) of **7f'**


Figure 69.¹³C NMR (125MH_Z, CDCl₃) of **7f**'

Electronic Supplementary Material (ESI) for RSC Advances This journal is © The Royal Society of Chemistry 2014



Figure 70. ¹H NMR (500MHz, DMSO-d6) of **2B**





Figure 72. ¹H NMR (500MHz, DMSO-d6) of **4B**







Figure 75. ¹³C NMR (125MHz, CDCl₃) of **5B**























Figure 85. ¹H NMR (500MHz, CDCl₃) of 3F







Figure 88. ¹H NMR (500MHz, CDCL₃) of **5**F.



Figure 89. ¹³C NMR (125MHz, CDCL₃) of **5F**



Figure 90. ¹H NMR (500MHz, CDCL₃) of **6B**







Figure 92. ¹H NMR (500MHz, CDCL₃) of **7B**





Figure 94. ¹H NMR (500MHz, CDCL₃) of **6B'**

Electronic Supplementary Material (ESI) for RSC Advances This journal is © The Royal Society of Chemistry 2014





Figure 96. ¹H NMR (500MHz, CDCL₃) of **7B'**





Figure 98. ¹H NMR (500MHz, CDCL₃) of **6E**







Figure 101.¹H NMR (500MHz, CDCL₃) of **7E**







Figure 104. ¹H NMR (500MHz, CDCL₃) of **6E'**












Figure 110.¹H NMR (500MHz, CDCL₃) of **6F**









Figure 114. ¹H NMR (500MHz, CDCL₃) of **6F'**



Figure 115.¹³C NMR (125MHz, CDCL₃) of **6F'**



Figure 116. ¹H NMR (500MHz, CDCL₃) of **7F'**

