Electronic Supplementary Material

Unravelling the bottleneck of phosphonic acid anchoring groups aiming towards enhancing the stability and efficiency of mesoscopic solar cells

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Electrochemical characterization

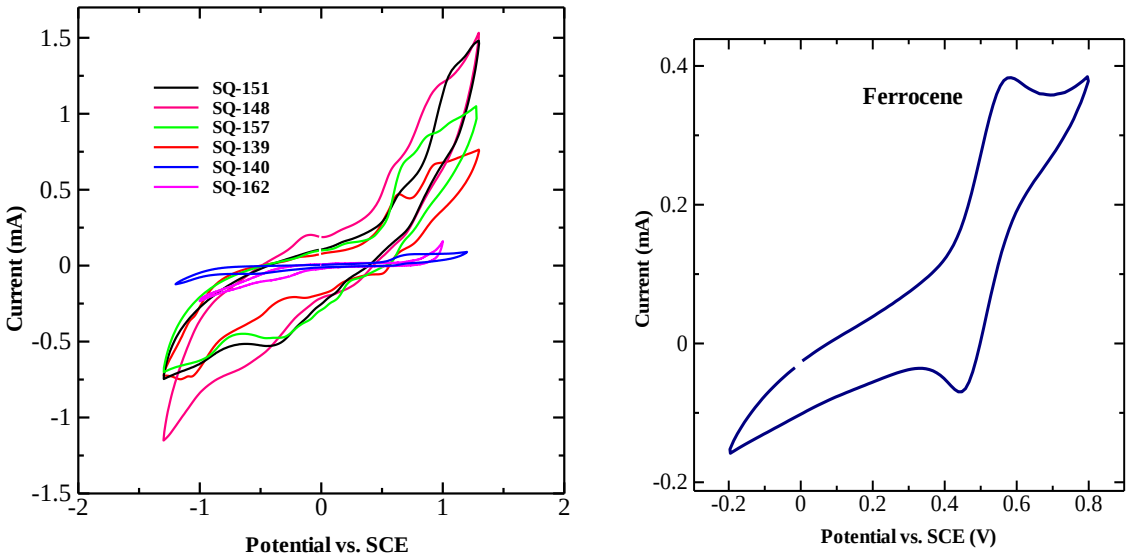


Figure. S1. Cyclic voltammogram of unsymmetrical squaraine dyes and ferrocene (2 mM) in DMF using 200 mM of Tetrabutylammoniumhexaflourophosphate as electrolyte recorded at 20 mV/s. In every case, Pt foil, Pt wire, and saturated calomel electrode (SCE) were used as a counter, working, and reference electrodes, respectively.

Dye adsorption behavior on thin films of mesoporous TiO_2

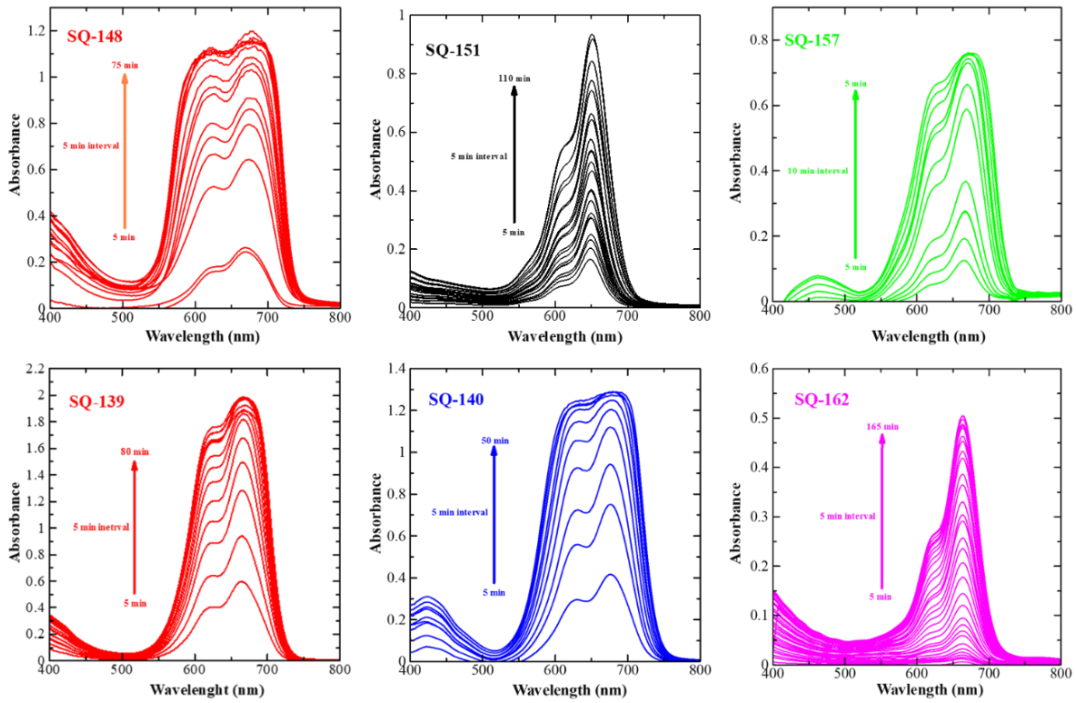


Figure S2. Electronic absorption spectra of unsymmetrical squaraine dyes adsorbed on the thin films of mesoporous TiO_2 (4 mm) measured after their adsorption for different times until saturation. In case, a dye solution of 0.1 mM in ethanol was used for the time-dependent dye adsorption studies at room temperature.

FTIR spectra for the binding mode of SQ-162 on TiO_2

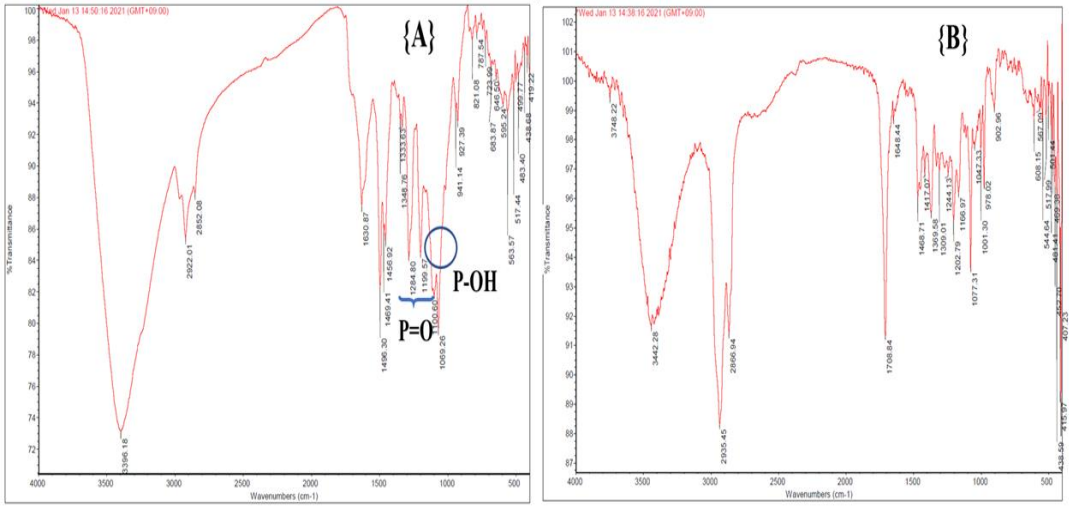
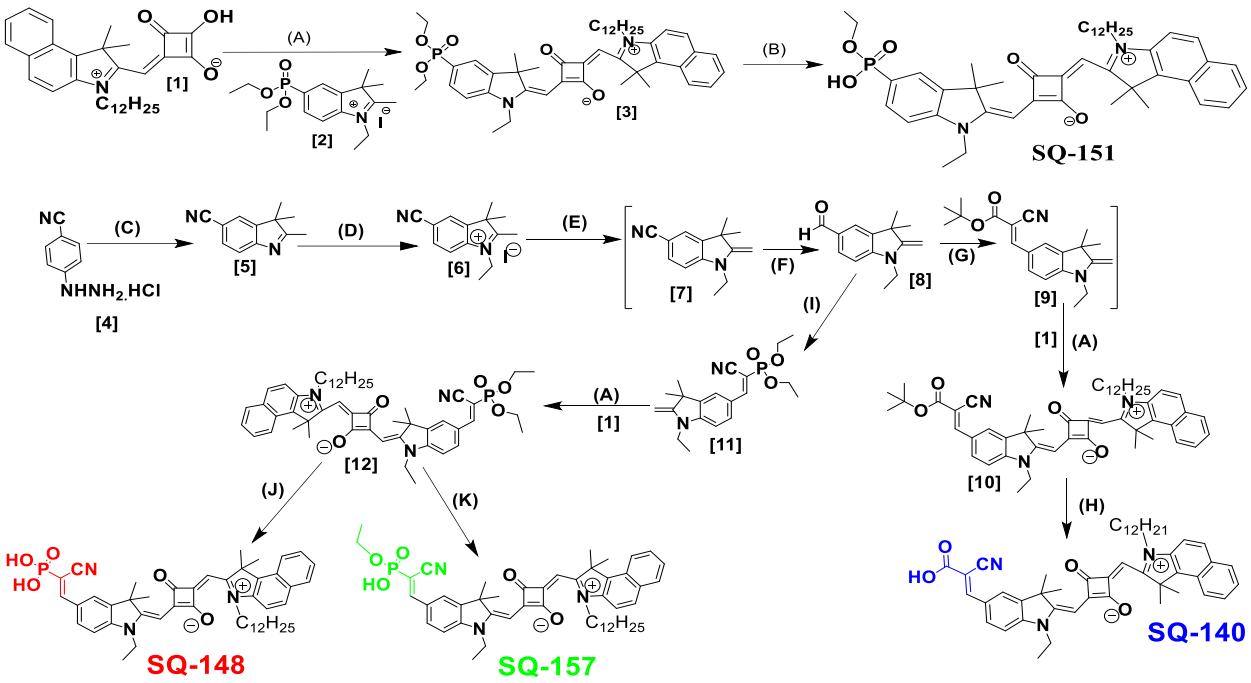
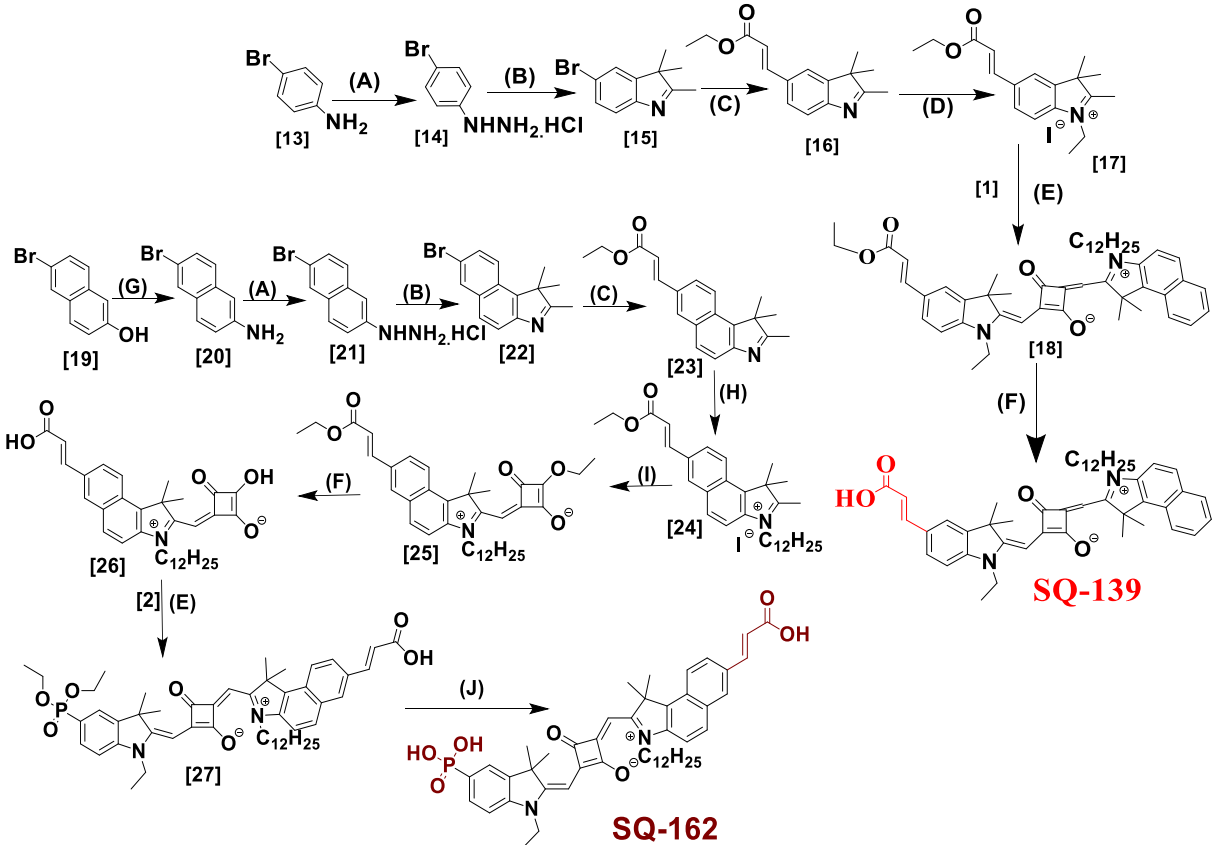


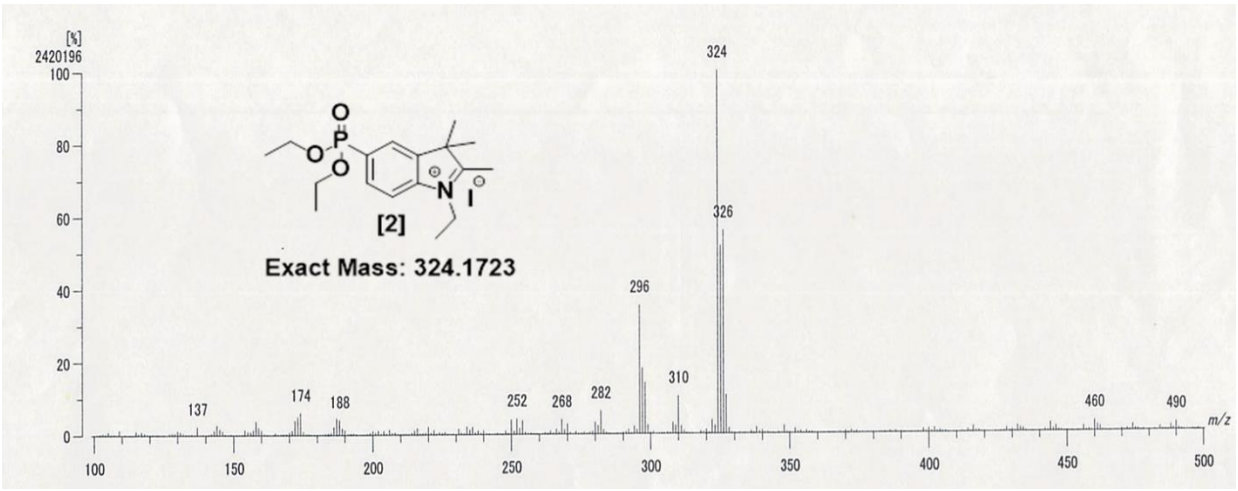
Figure S3 Fourier Transform Infrared spectra for the dye SQ-162: Free dye {A} and after its binding with TiO_2 {B}.



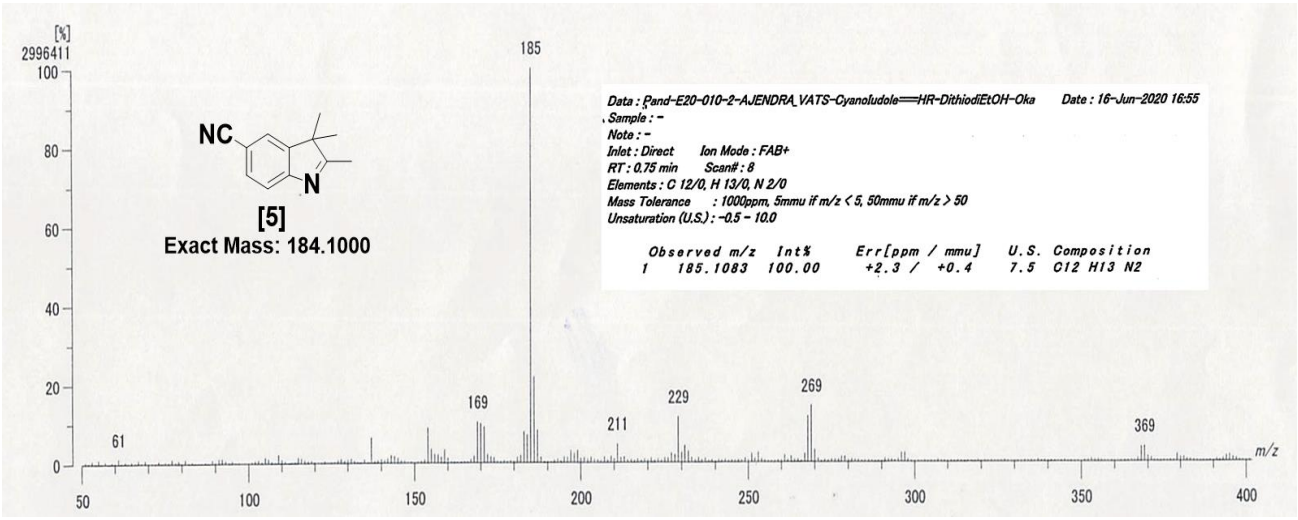
Synthetic Scheme-1



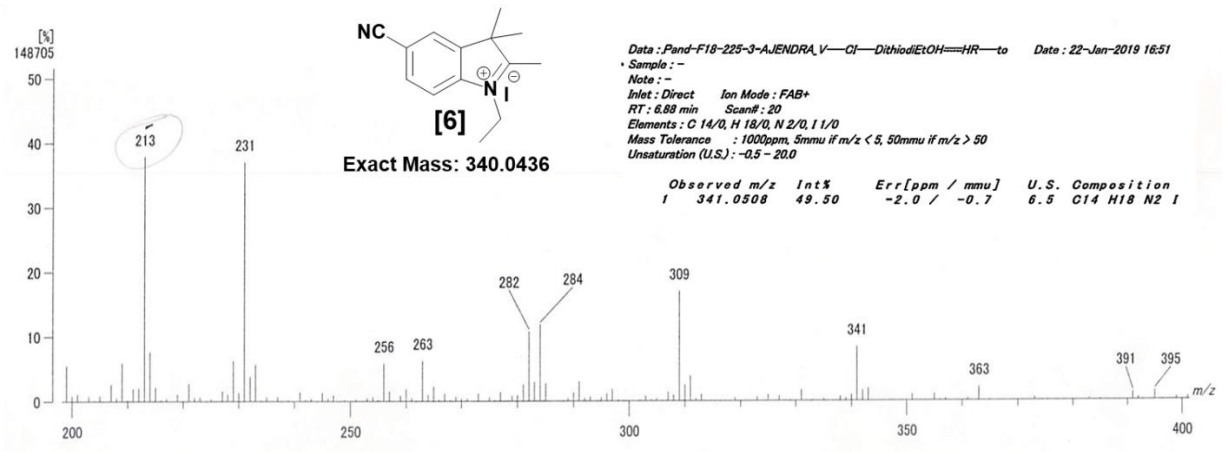
Synthetic Scheme-2



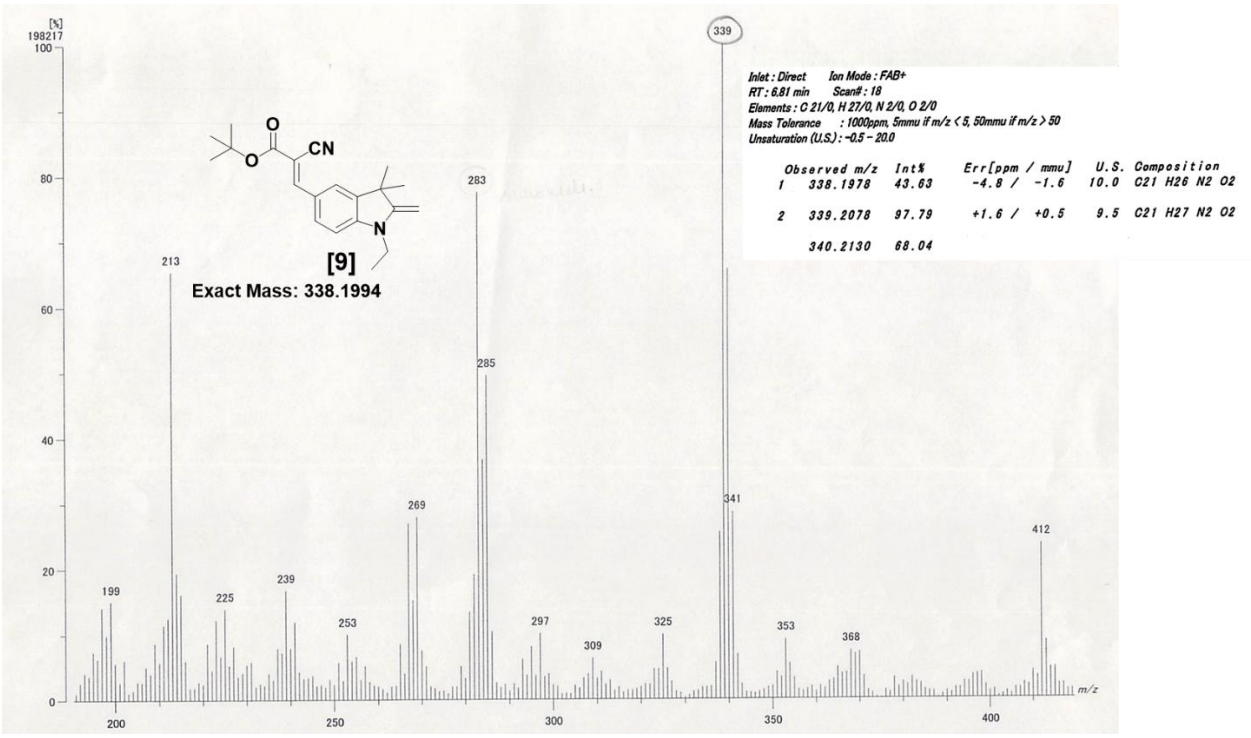
FAB-MS of the intermediate **(2)**



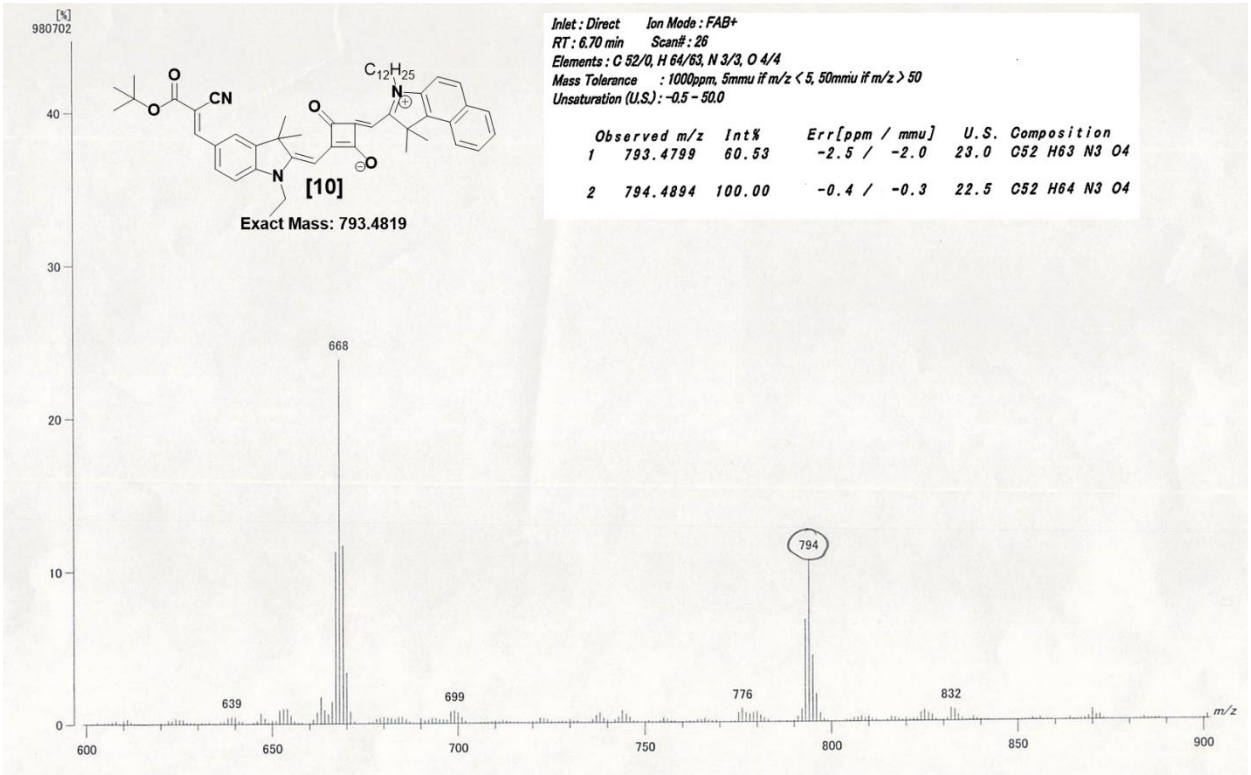
FAB-MS & HR FAB-MS of the intermediate **(5)**



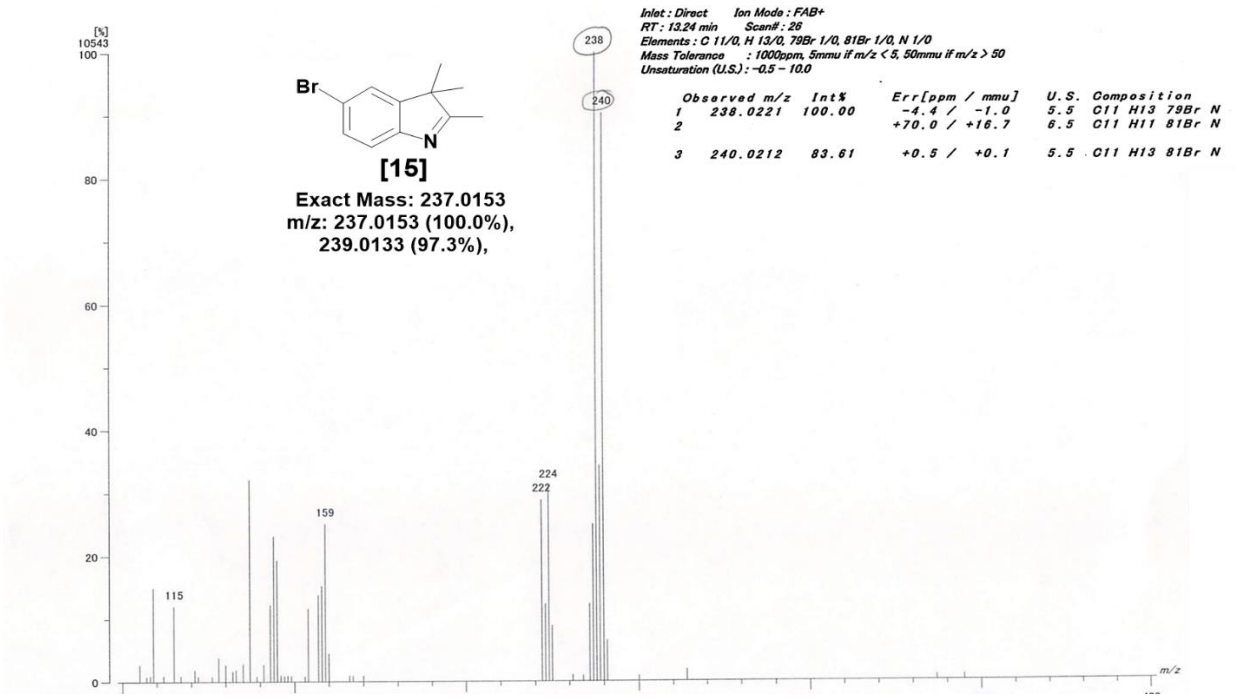
FAB-MS & HR FAB-MS of the intermediate **(6)**



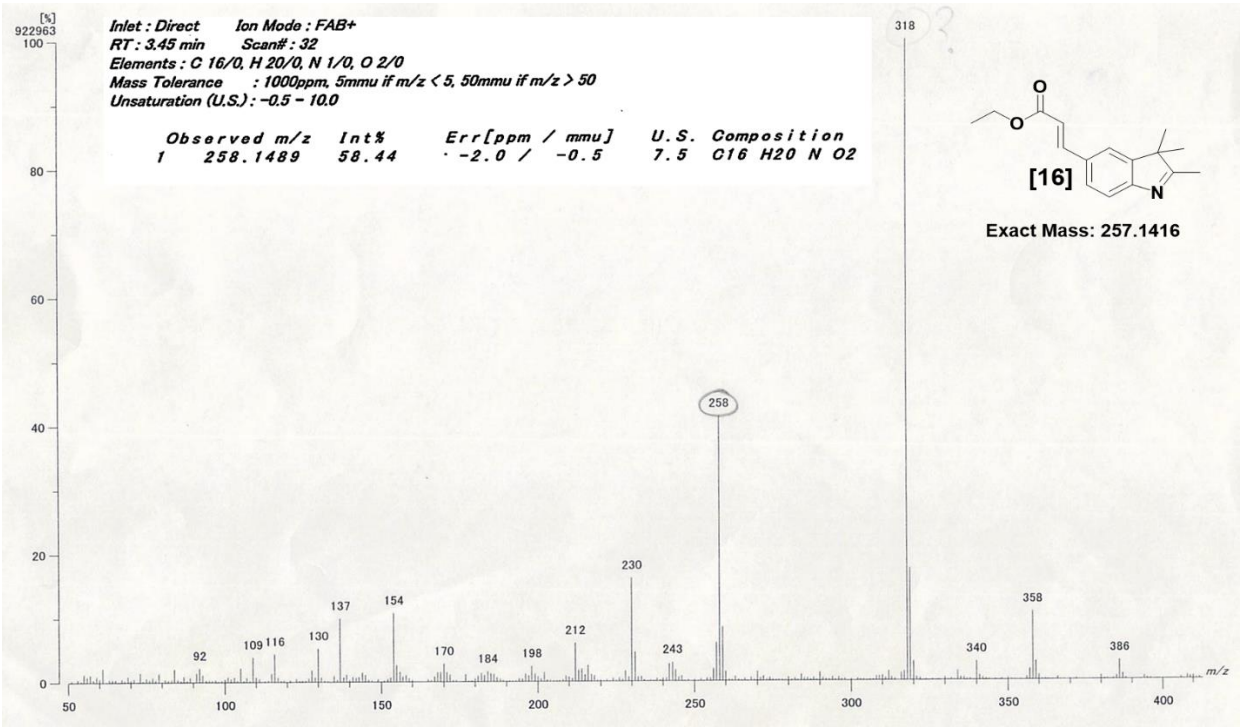
FAB-MS & HR FAB-MS of the intermediate **(9)**



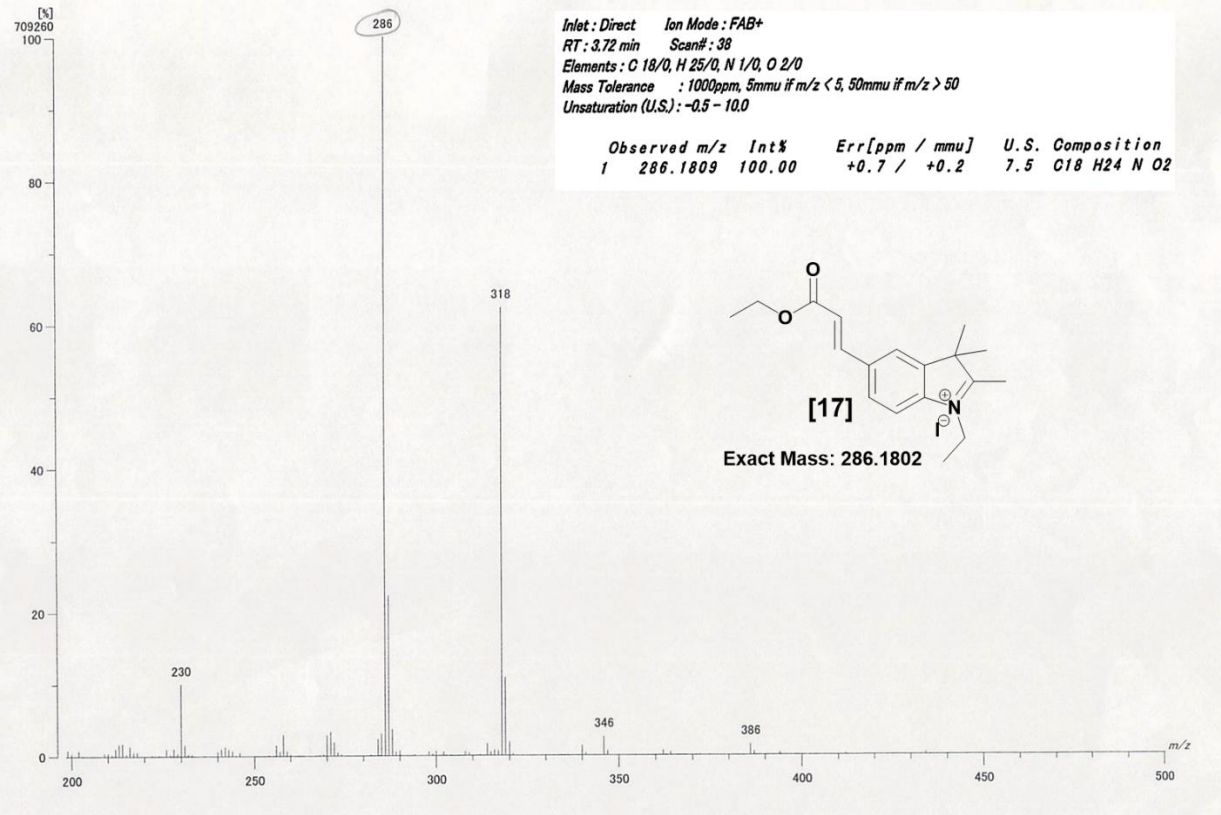
FAB-MS & HR FAB-MS of the intermediate **(10)**



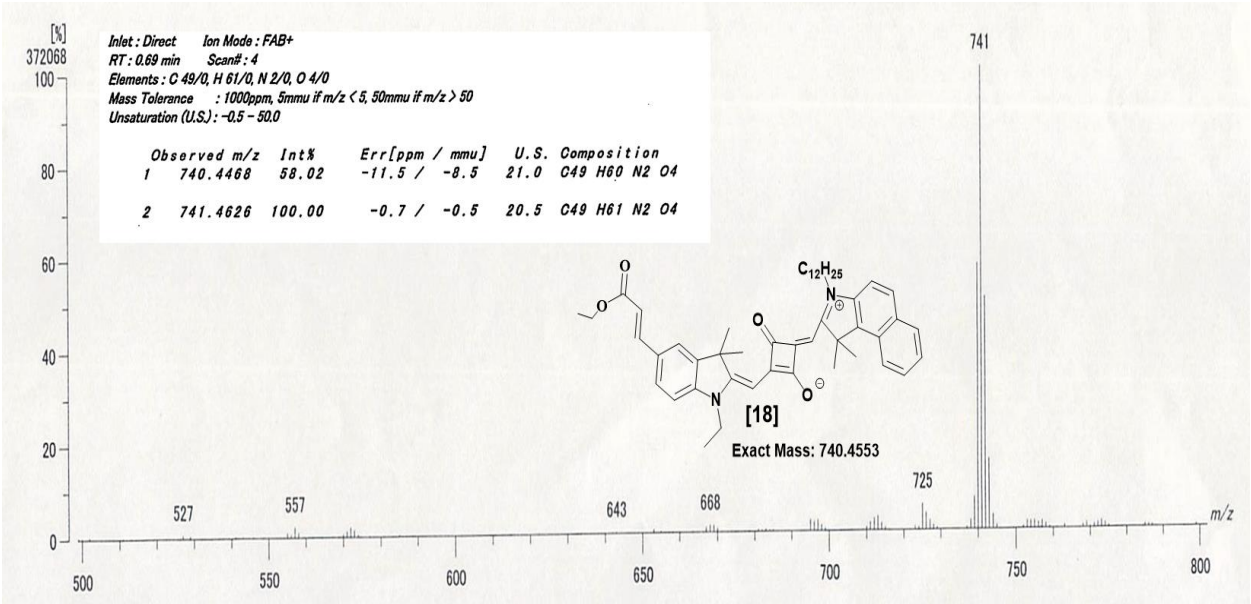
FAB-MS & HR FAB-MS of the intermediate **(15)**



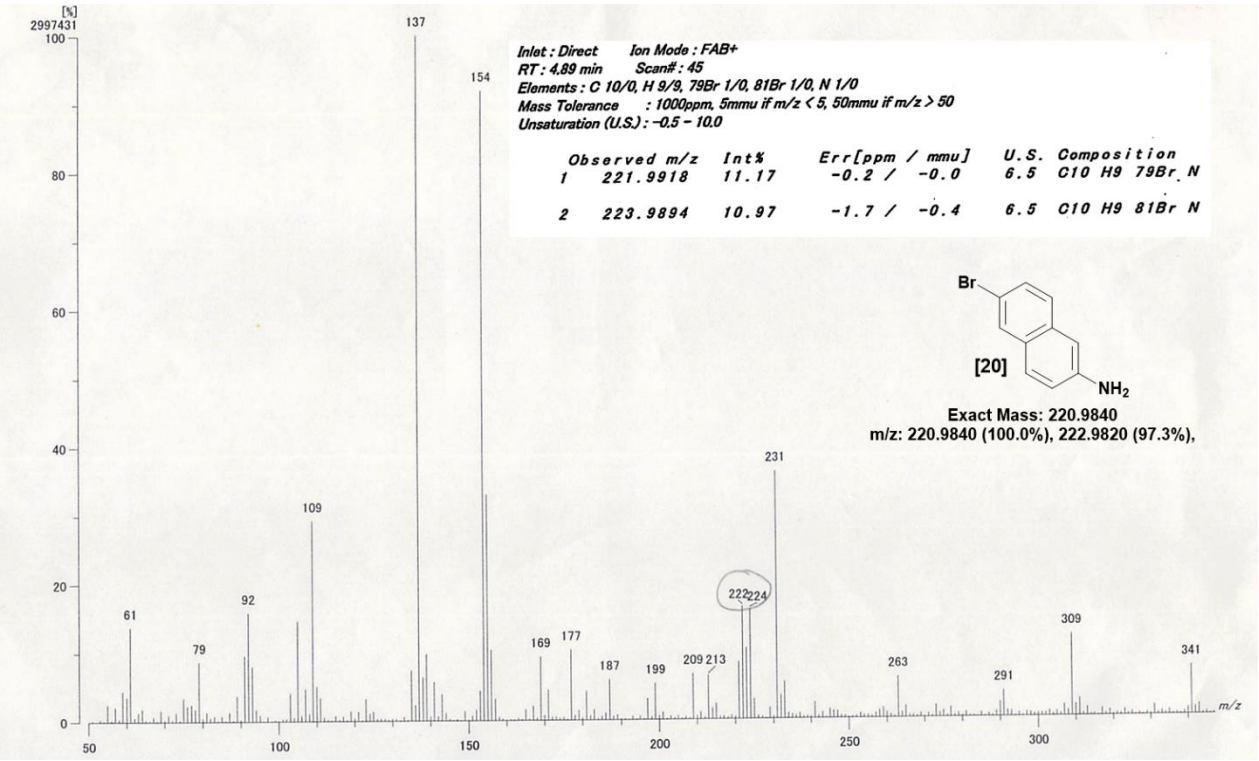
FAB-MS & HR FAB-MS of the intermediate **(16)**



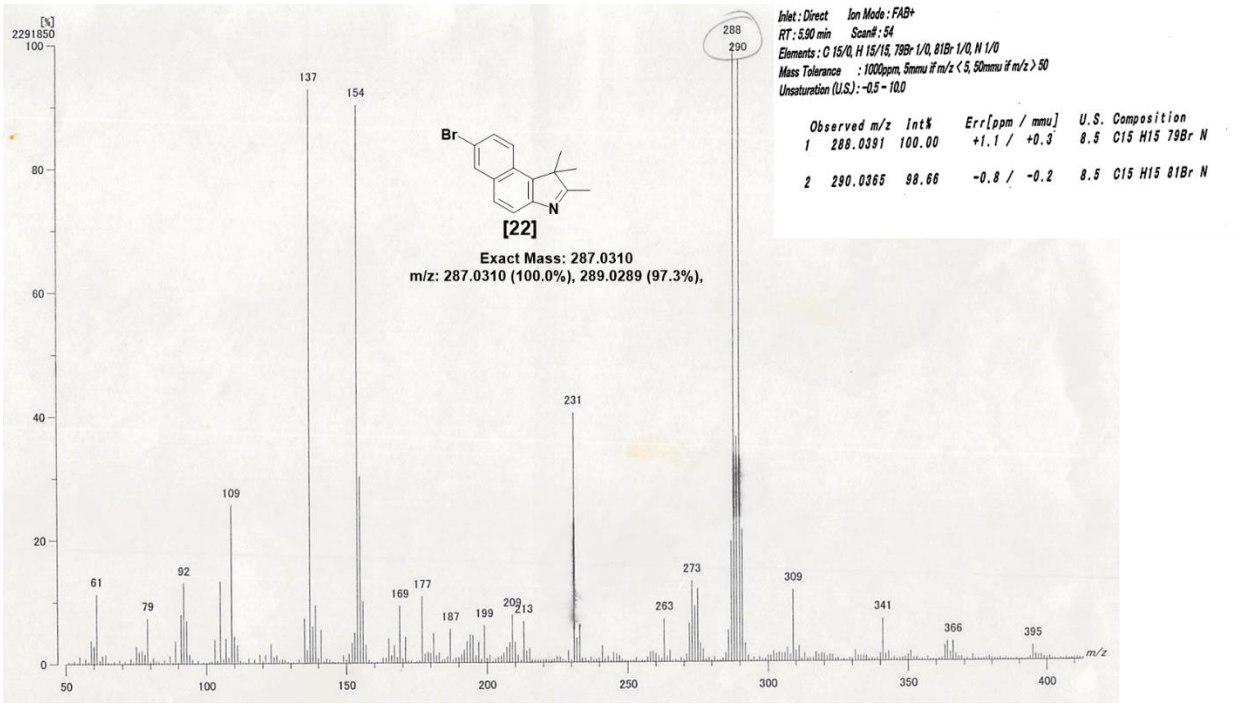
FAB-MS & HR FAB-MS of the intermediate **(17)**



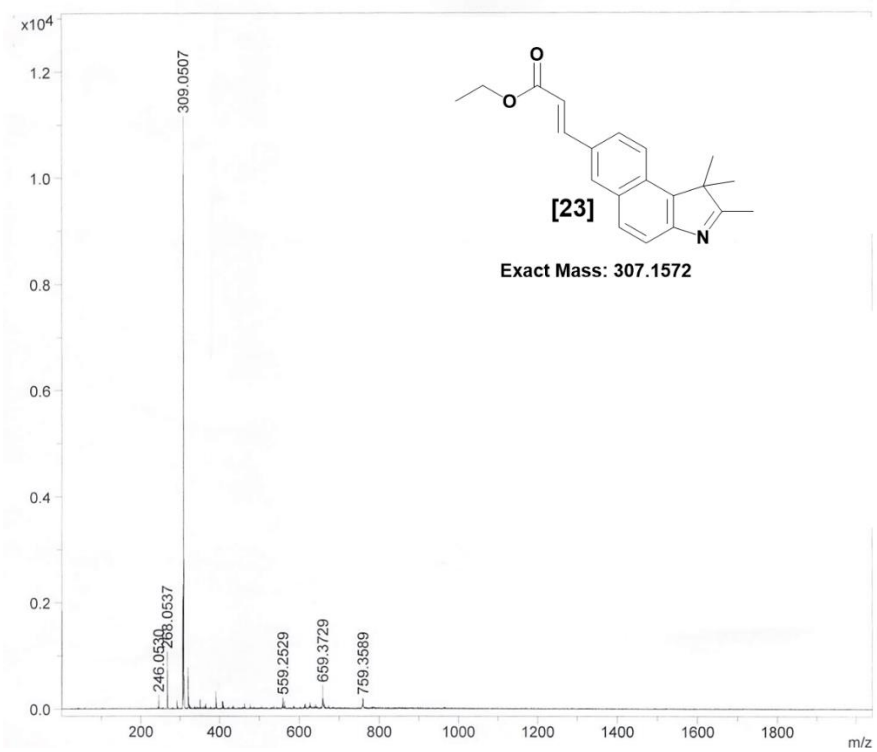
FAB-MS & HR FAB-MS of the intermediate **(18)**



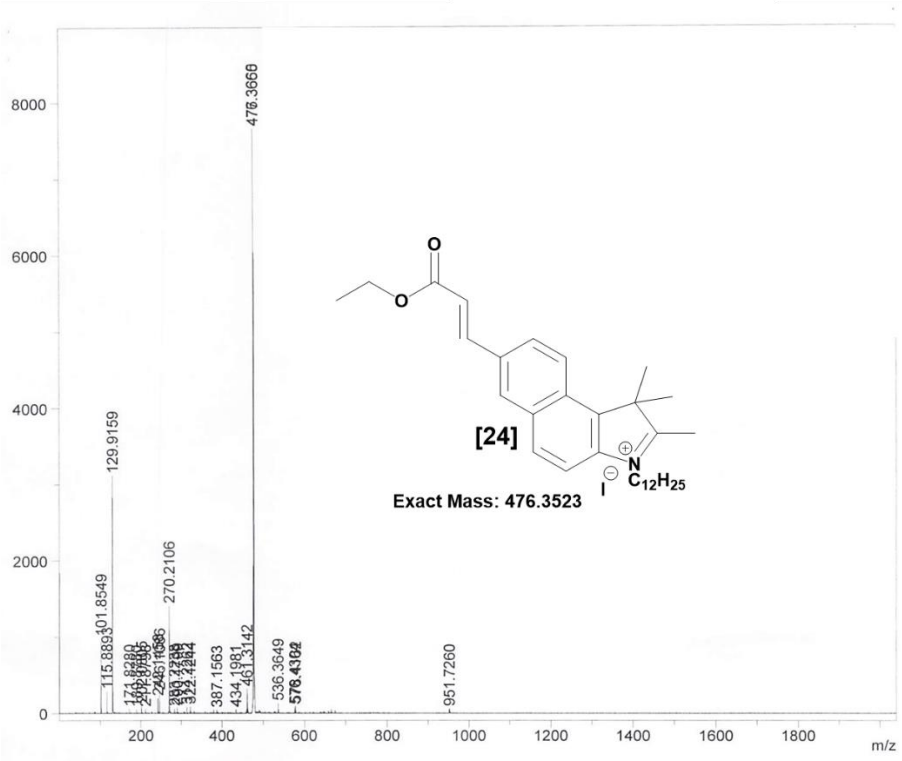
FAB-MS & HR FAB-MS of the intermediate **(20)**



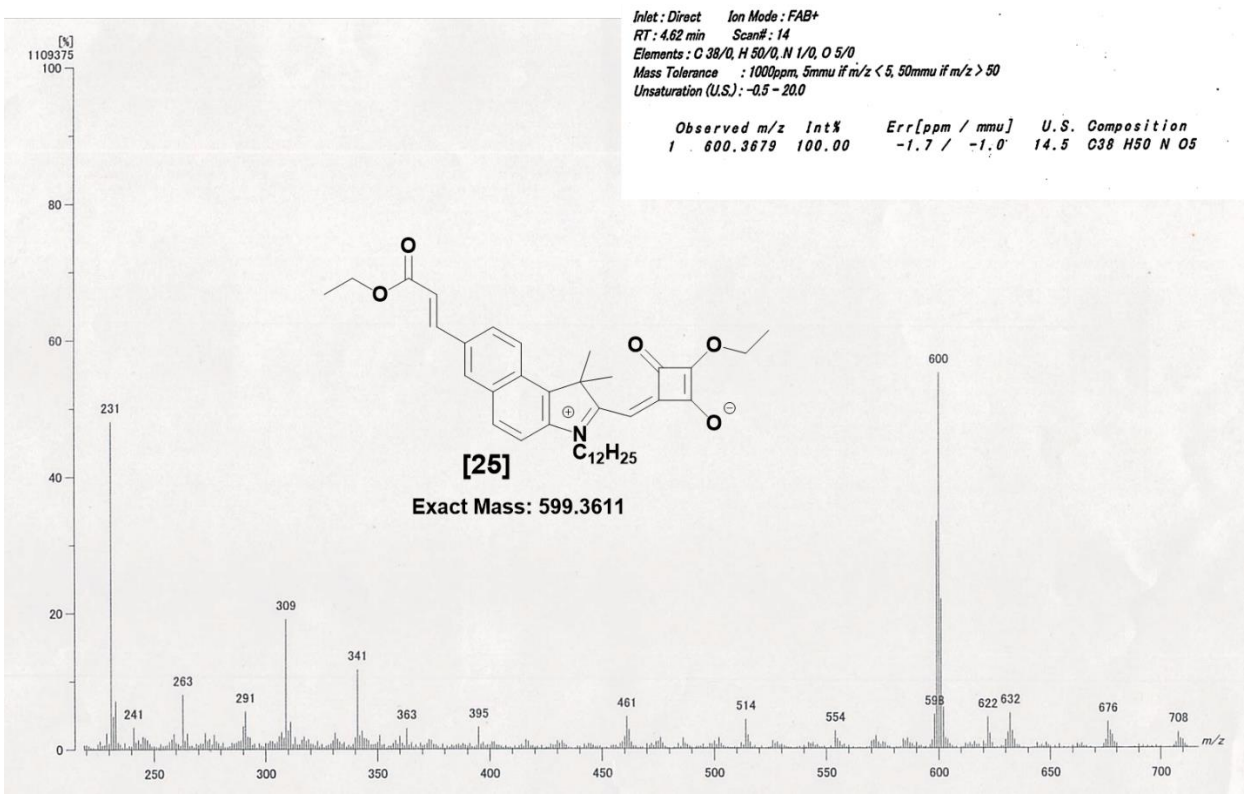
FAB-MS & HR FAB-MS of the intermediate **(22)**



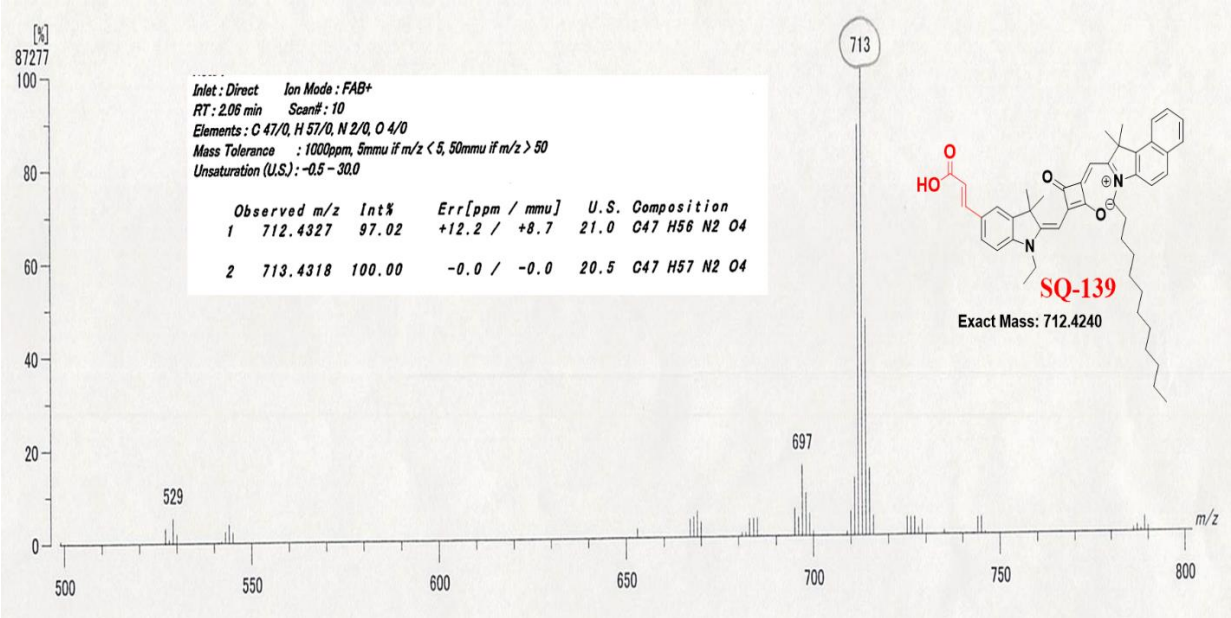
LALDI TOFMS of the intermediate **(23)**



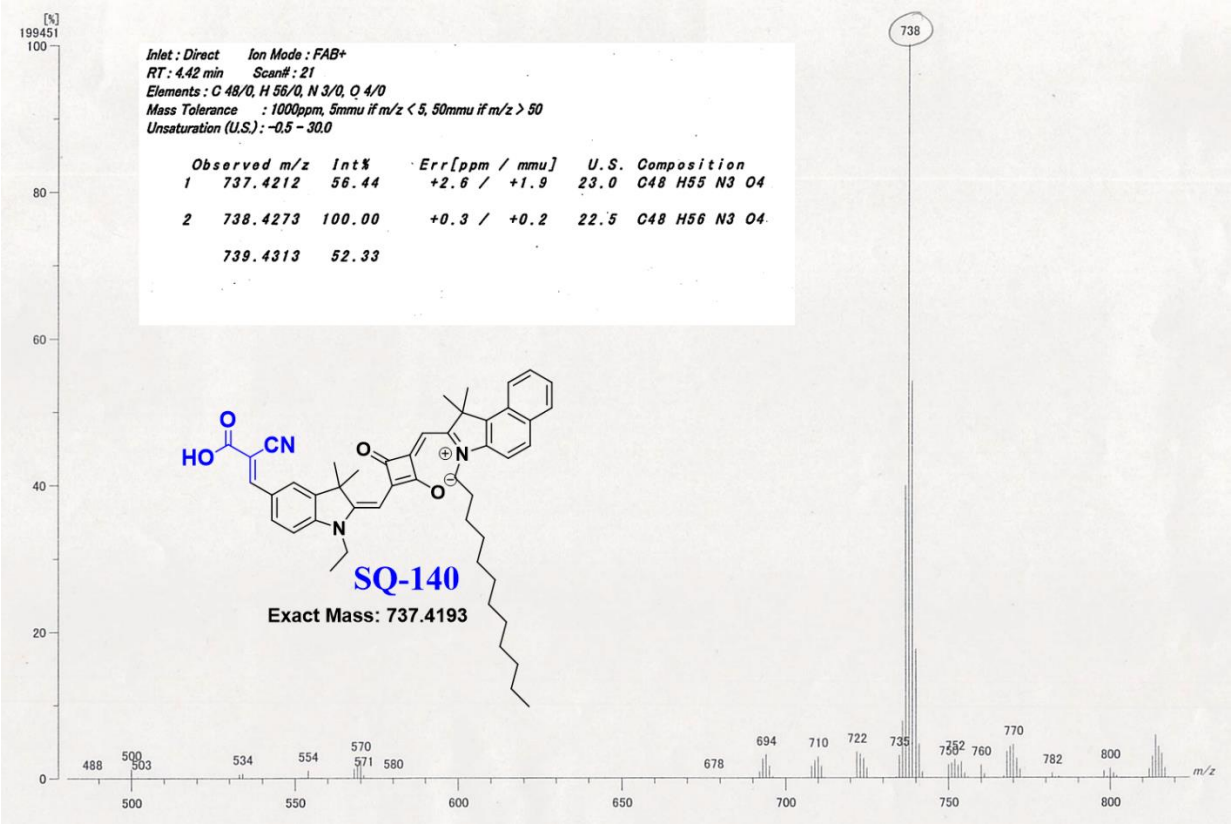
LALDI TOFMS of the intermediate **(24)**



FAB-MS & HR FAB-MS of the intermediate **(25)**



FAB-MS & HR FAB-MS of the Squaraine dye SQ-139



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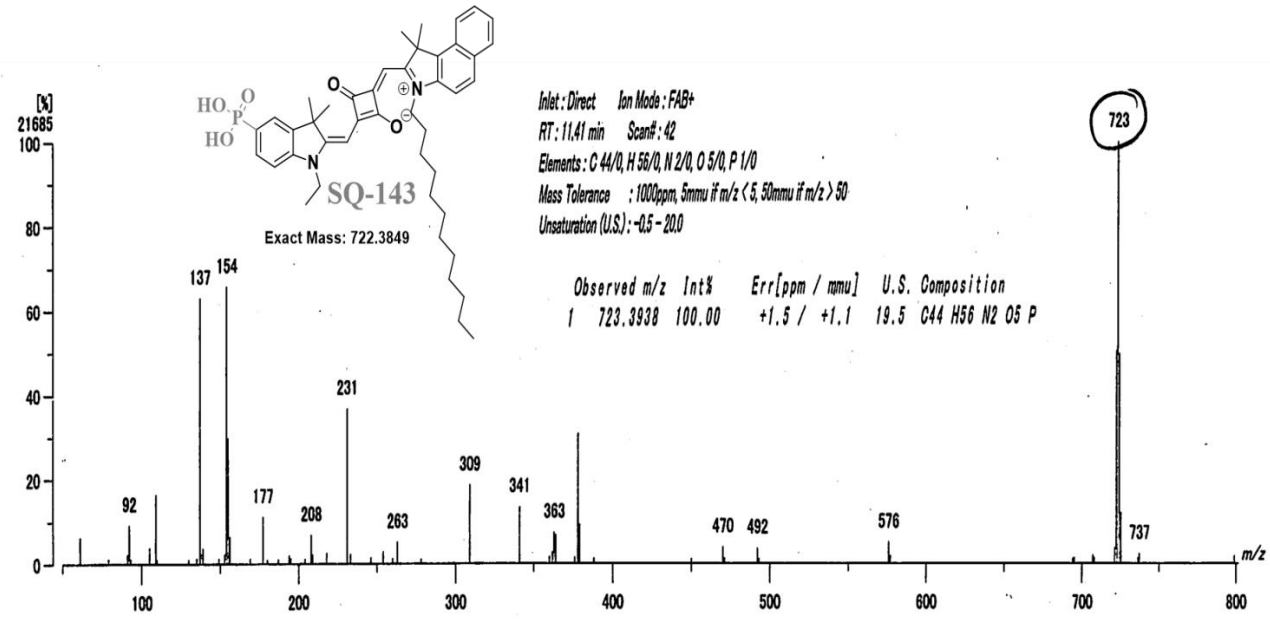
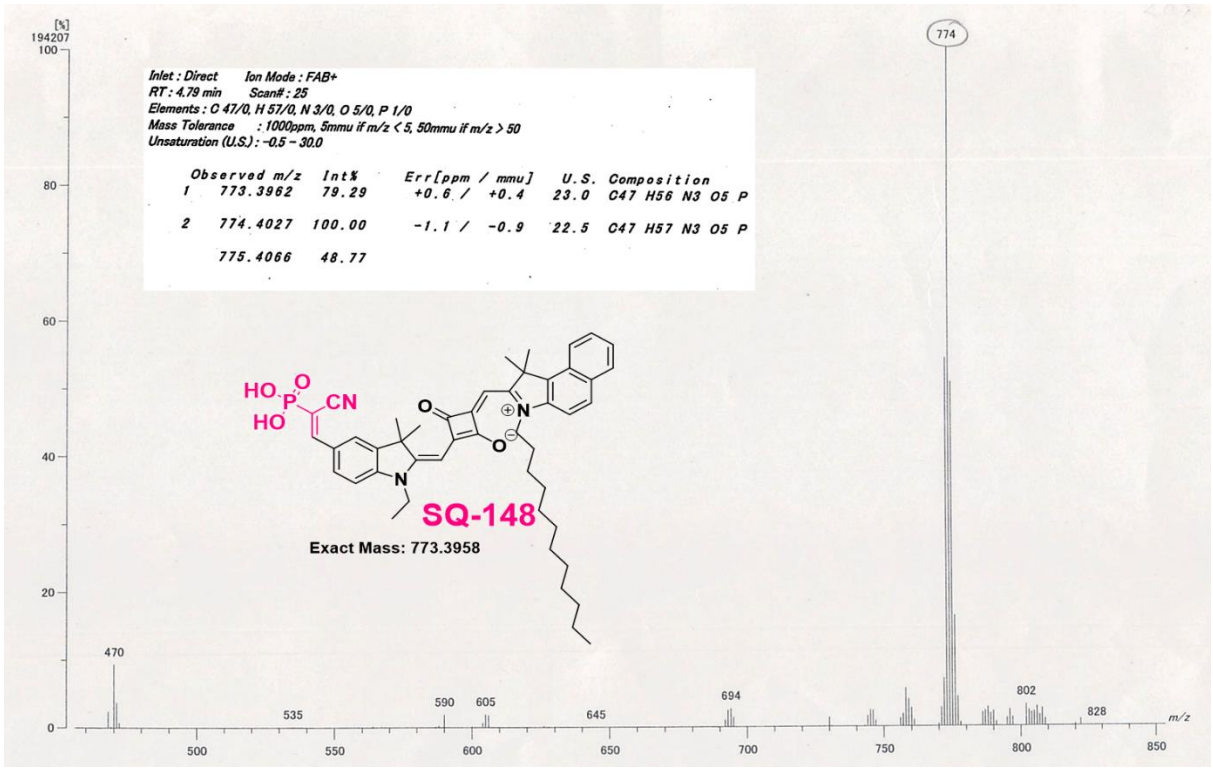
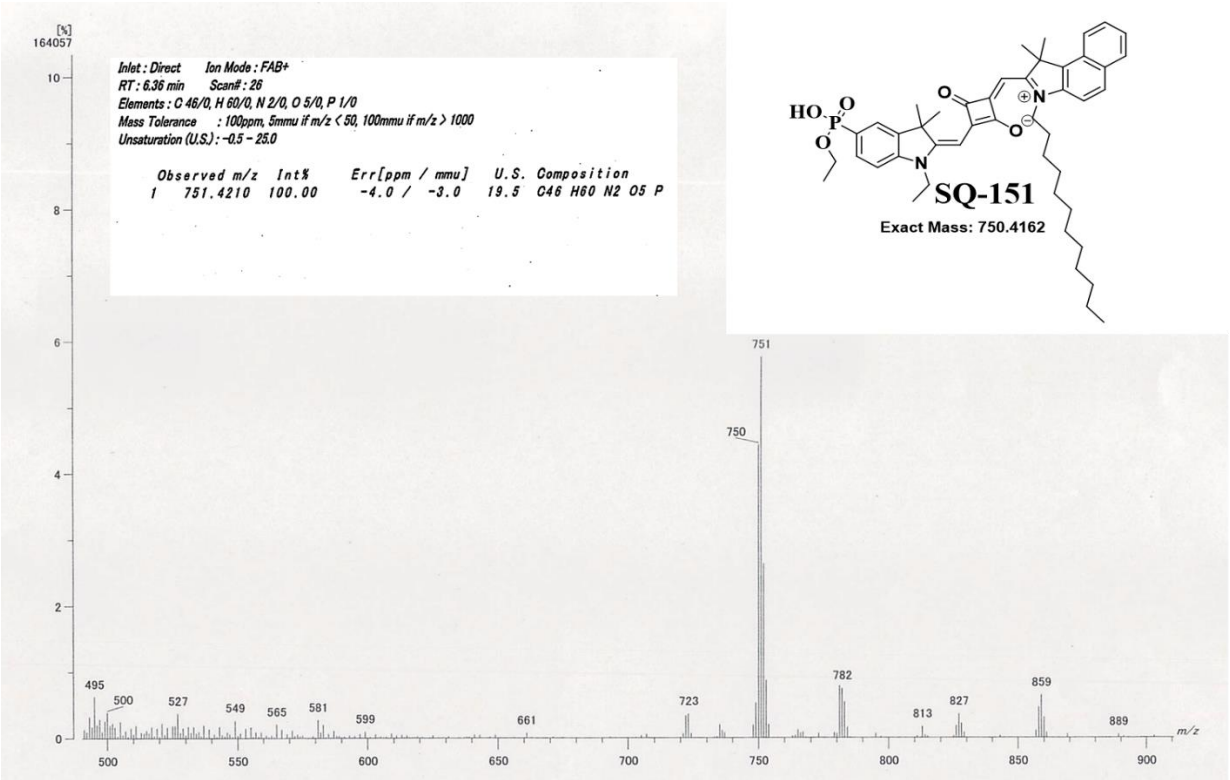


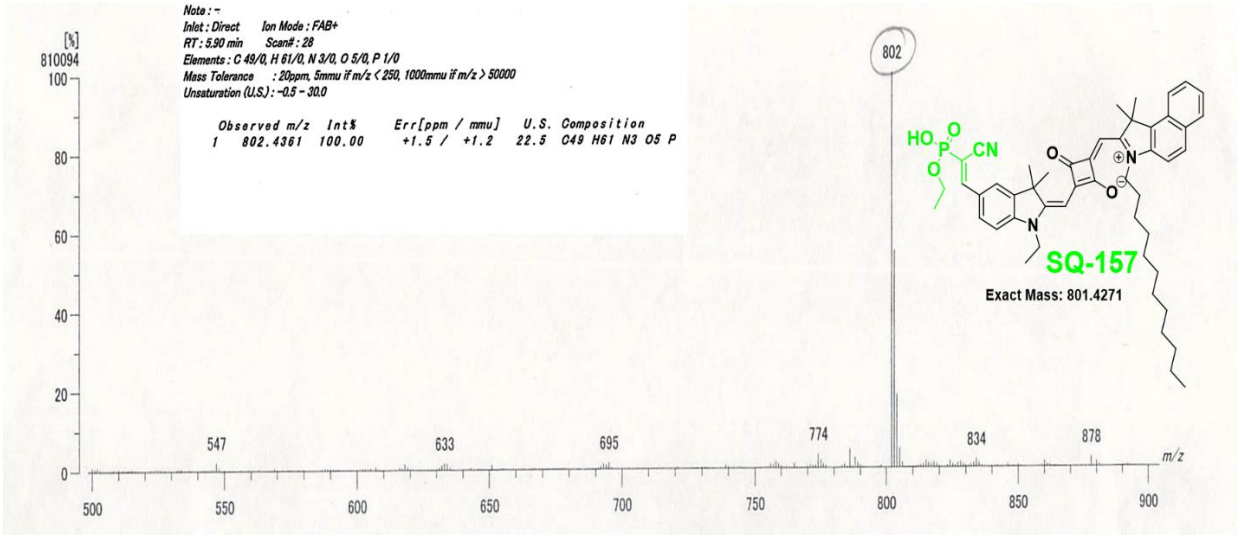
FAB-MS & HR FAB-MS of the Squaraine dye SQ-143



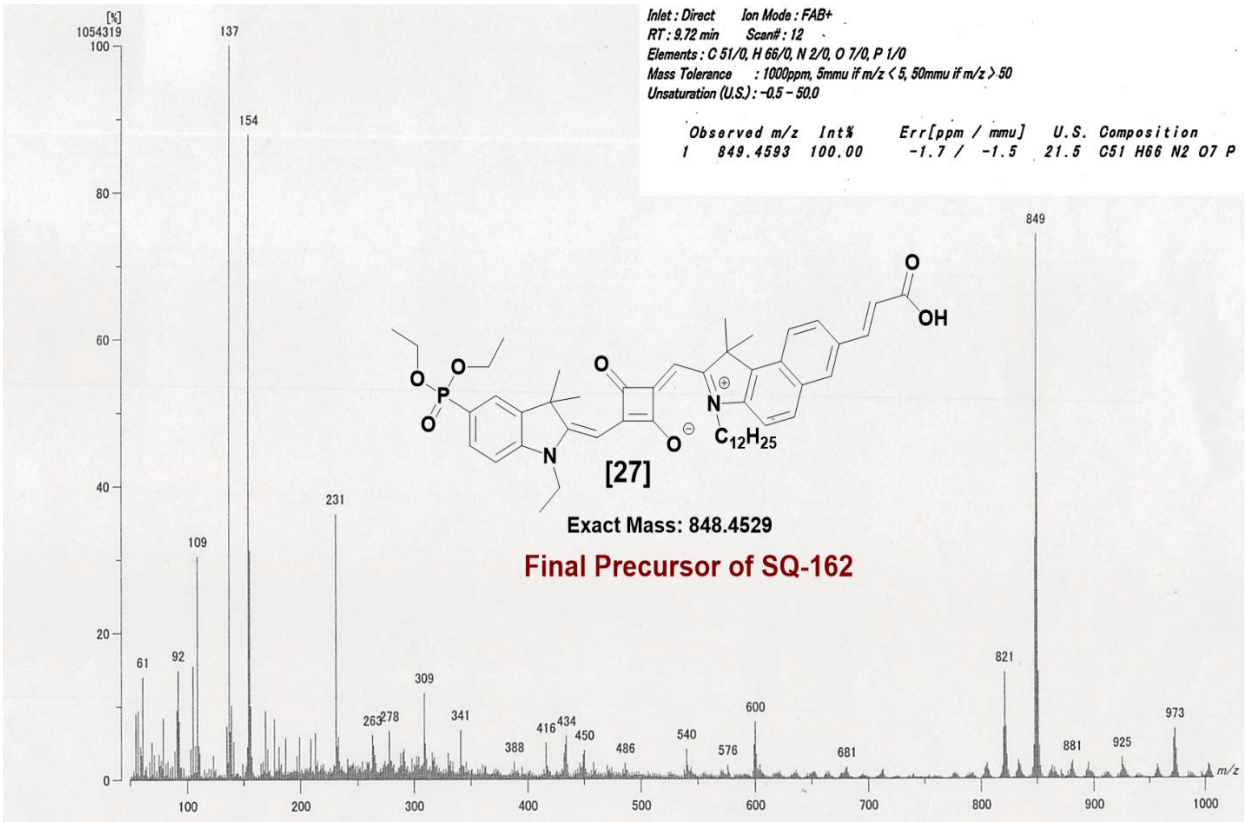
FAB-MS & HR FAB-MS of the Squaraine dye SQ-148



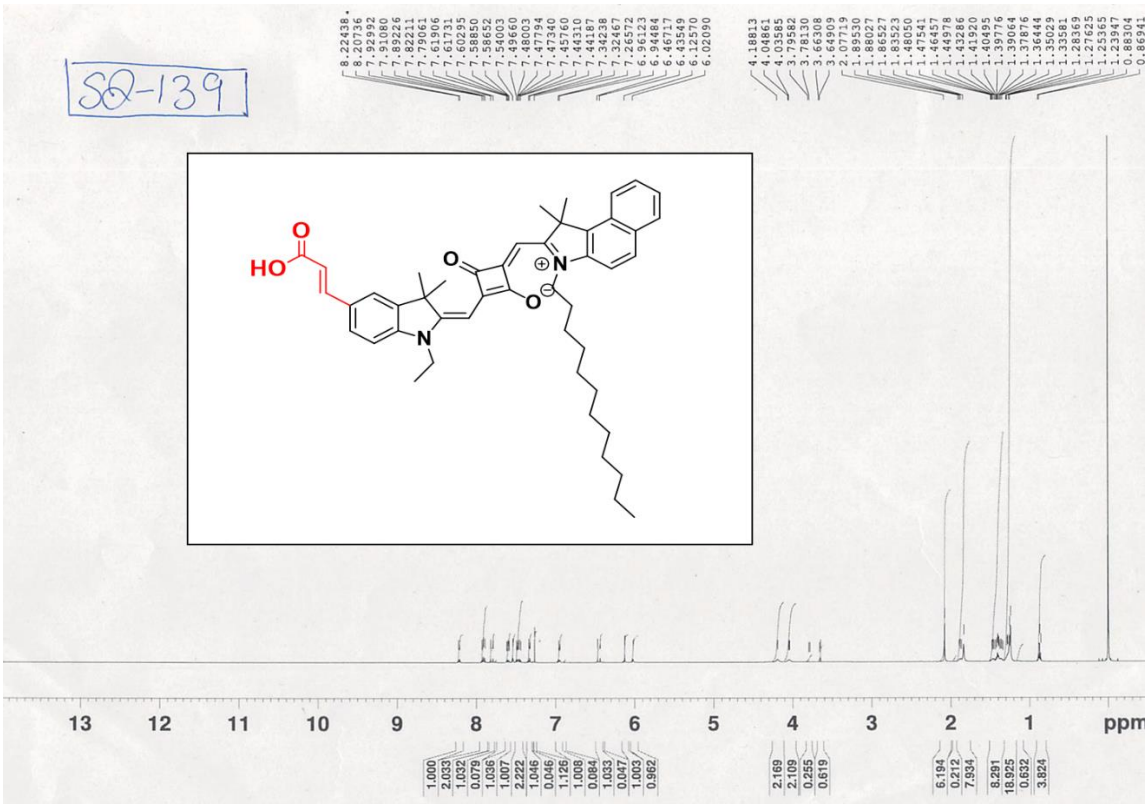
FAB-MS & HR FAB-MS of the Squaraine dye SQ-151



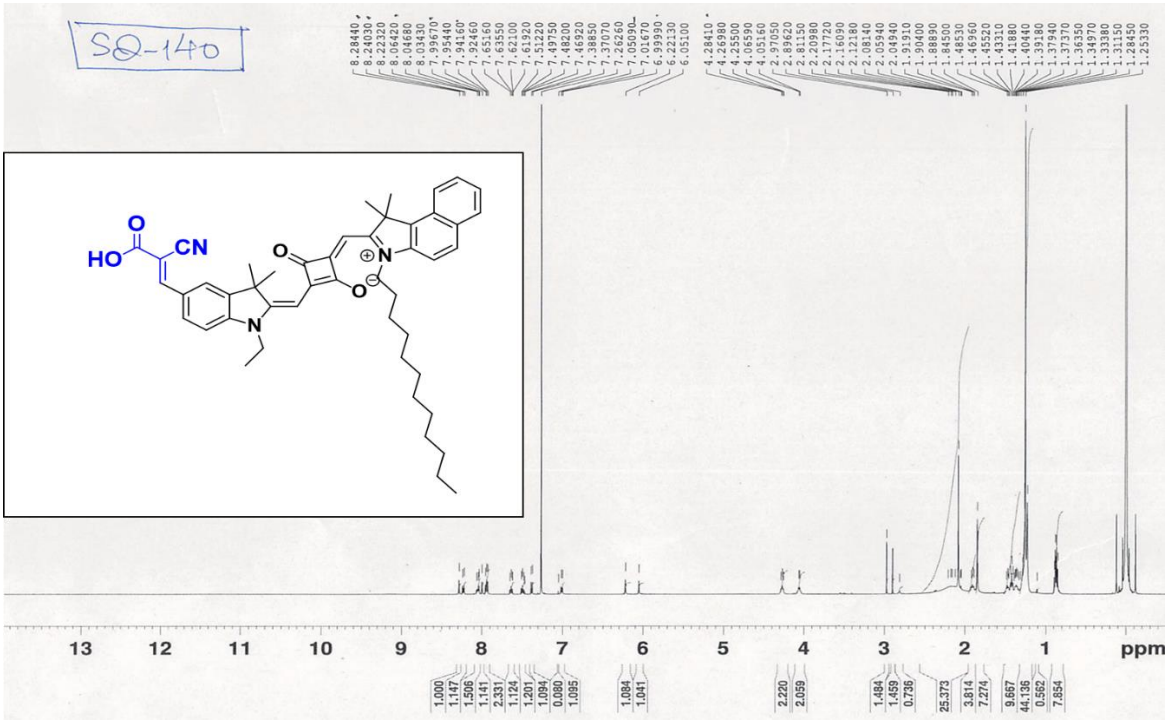
FAB-MS & HR FAB-MS of the Squaraine dye SQ-157



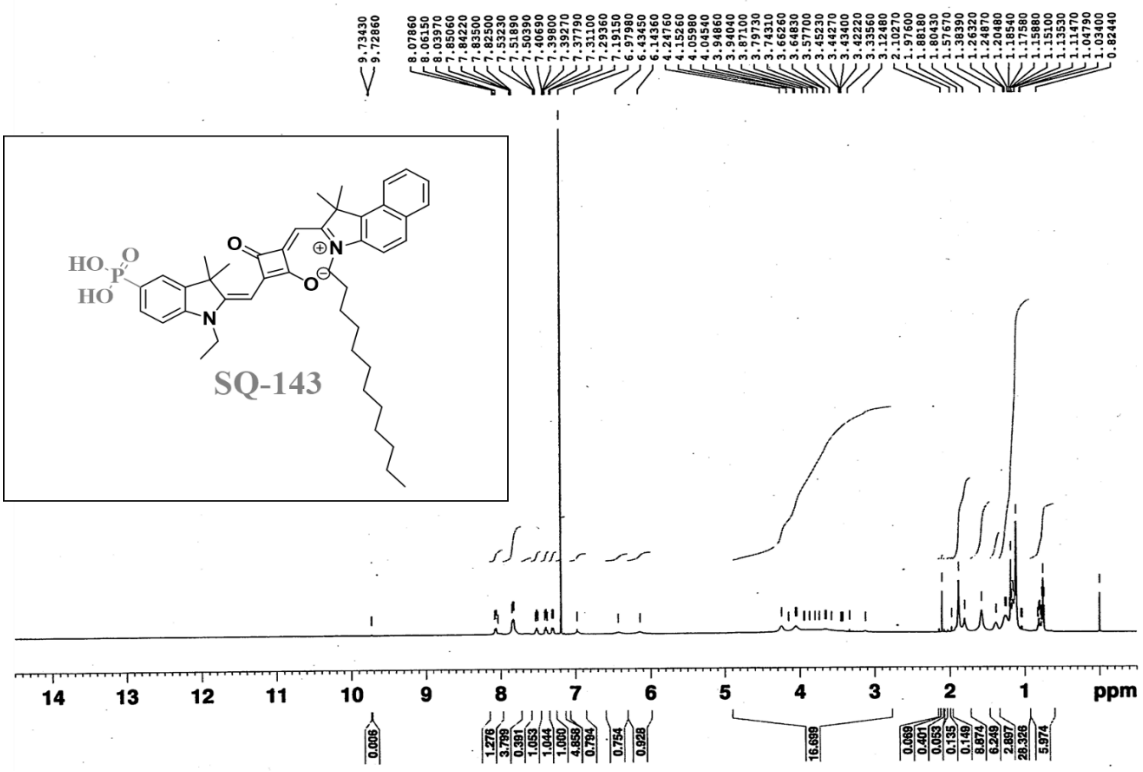
FAB-MS & HR FAB-MS of the Squaraine dye SQ-162



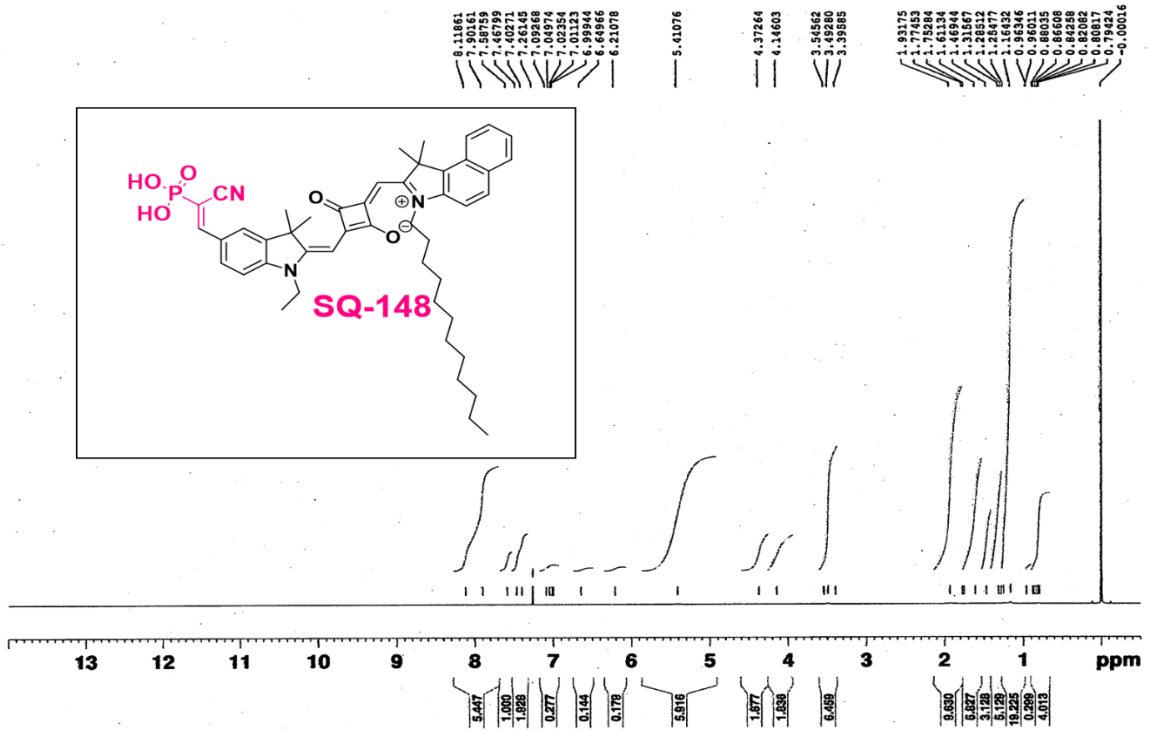
Proton NMR of the Squaraine dye SQ-139



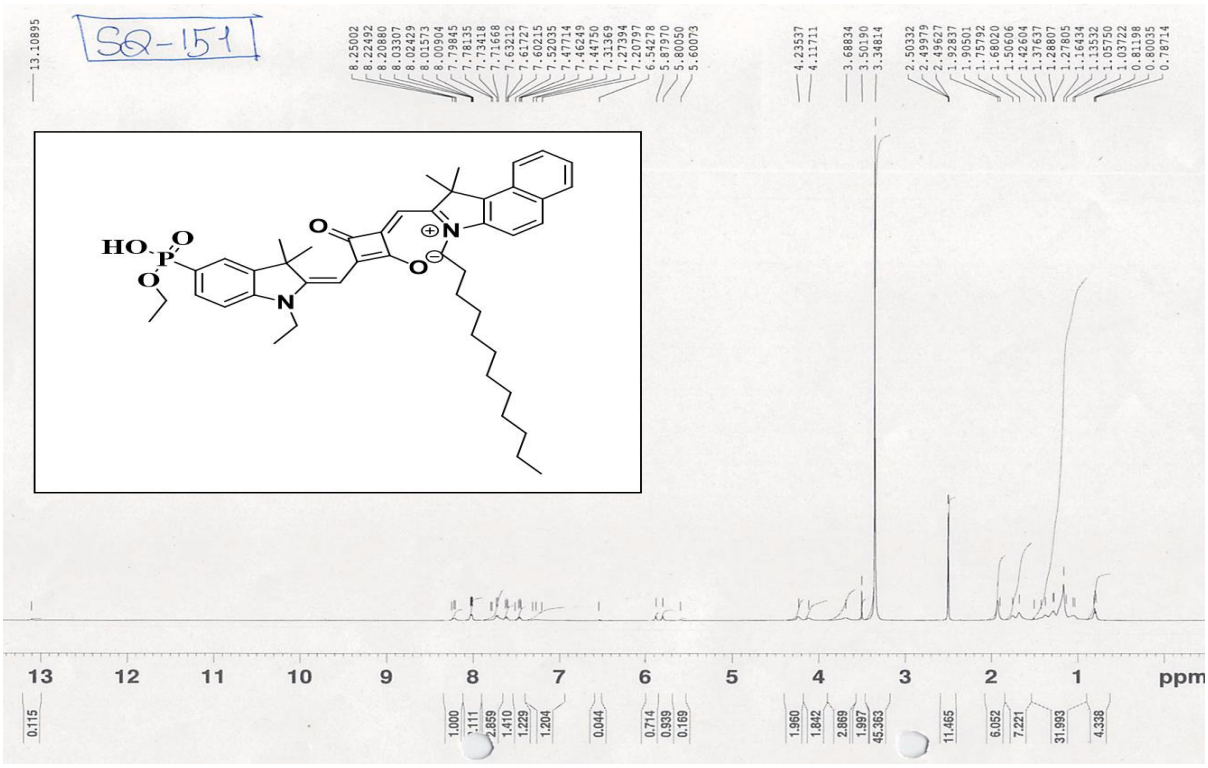
Proton NMR of the Squaraine dye SQ-140



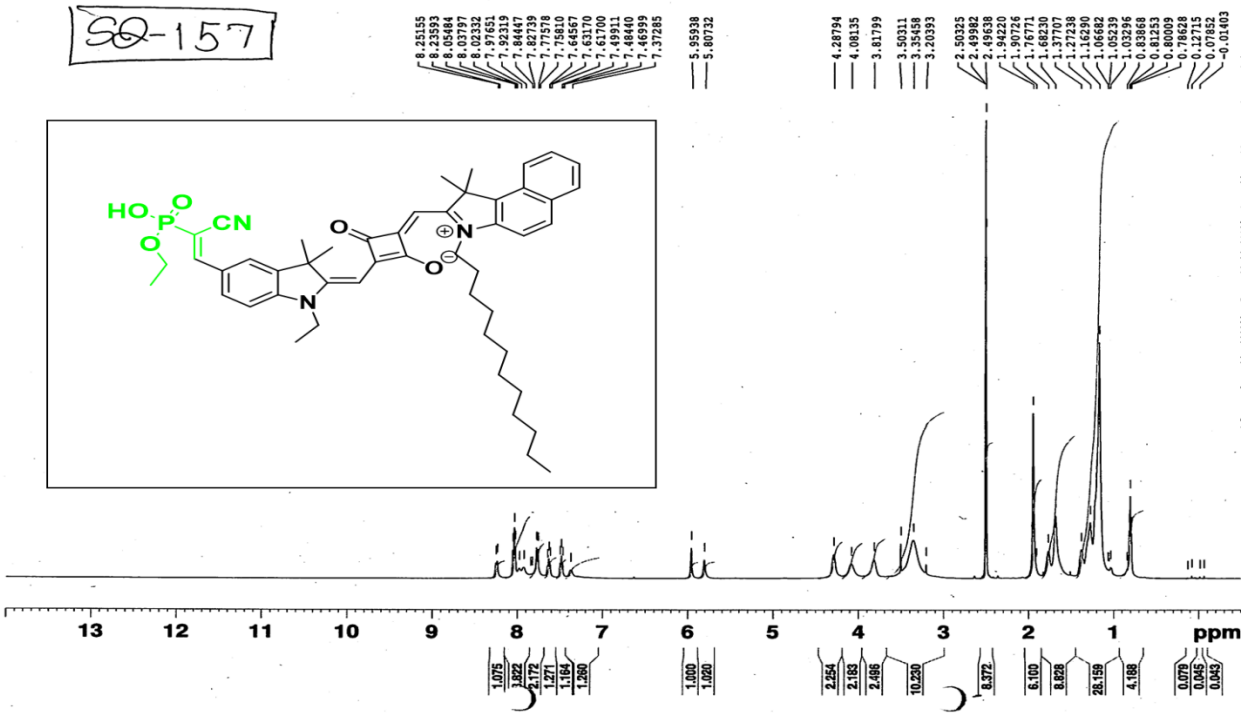
Proton NMR of the Squaraine dye SQ-143



Proton NMR of the Squaraine dye SQ-148



Proton NMR of the Squaraine dye SQ-151



Proton NMR of the Squaraine dye SQ-157