# CHAPTER V

# CONCLUSION

In this work, a series of the benzo-BODIPY **3b-c** compounds bearing mono- and bithienyl unit at the *meso*-positions were successfully synthesized from condensation between isoindole **5** and $\alpha$-functionalized carboxaldehyde thiophene. Then, the aromatization step was performed prior to $BF_2$-complexation. The introduction of the $\alpha$-ester groups and the $\beta$-extended $\pi$-conjugation of BODIPYs as the fused benzo rings caused the red-shift of the absorption and emission maxima by 144 and 142 nm, respectively. Compared to the BODIPY series, the benzo-BODIPYs derivatives were found to have smaller energy gap and tended to have higher fluorescence quantum yields. The replacement of meso phenyl group by meso thienyl one caused the red shift of absorption and emission maxima by 14 and 13 nm, respectively. This is attributed to the smaller steric hindrance caused by the *meso*-thienyl ring compared to that caused by the *meso*-phenyl group. However, the further extension of the thienyl unit by introducing the second thienyl ring at the thienyl $\alpha$-positions did not significantly affect the absorption and emission maxima of BODIPYs. The introduction of the two fused-cyclohexenyl rings on BODIPY led to the absorption red shift of 42 nm, probably due to the slightly increased rigidity of the molecule caused by the two fused-cyclohexenyl rings on pyrrolic rings. The fused-cyclohexenyl rings on BODIPY ***2*** to give BODIPY **4b** caused narrow of emission signal compared to the emission of BODIPY **2**. The benzanulation on fused-cyclohexenyl BODIPY caused the further red-shift of the absorption and emission maxima by approximately 100 nm. All target BODIPYs exhibited satisfactory solubility in various common organic solvents such as $CH_2Cl_2$, $CHCl_3$, toluene, THF, etc, enabling the use of these compounds in the wet processes for various applications. Our studies indicate that benzo-BODIPYs, are promising electropolymerization with semi-conducting polymer for optoelectronic applications.