

## CHAPTER IV

### CONCLUSION

An extensive series of *meso*-alkyne-linked porphyrin metal complexes has been synthesized by using the Sonogashira coupling reactions of porphyrin building blocks with various alkyne derivatives in satisfactory yield (11-88%). Porphyrin building blocks including dihexylporphyrin and dimesitylporphyrin derivatives were successfully prepared from dipyrromethane and corresponding aldehydes: heptaldehyde and mesitaldehyde, respectively. Because of better solubility in common organic solvents, dimesitylporphyrin derivatives were chosen to use as porphyrin building blocks for the coupling reactions. All of the synthesized alkyne-linked porphyrins were characterized by  $^1\text{H}$  NMR spectroscopy and MALDI-TOF mass spectrometry. In addition, UV-visible absorption spectroscopy and fluorescence emission spectroscopy were also used to investigate their photophysical properties. It has been demonstrated that central metal ions as well as some *meso*-substituents on porphyrin rings, especially alkyne linkers, affected the electronic absorption and emission spectra of the compounds. Spectroscopic results revealed that alkyne-linked porphyrin metal complexes showed higher  $\pi$ -conjugation compared to their porphyrin building blocks resulting in the outstanding red shifts in both absorption and emission spectra.

Coordination properties of synthesized porphyrins have been preliminarily studied by  $^1\text{H}$  NMR, UV-visible, and fluorescence spectroscopic titration of the compounds with pyridine. From the  $^1\text{H}$  NMR titration experiments, it suggested that central metal ions play an important role to coordinate with pyridine as axial ligand and the coordination of porphyrins and pyridine is 1:1 complexation. The significant red shifts in absorption spectra and decreasing of the fluorescence intensity upon an addition of pyridine also indicated the formation of porphyrin-pyridine complexes. Interestingly, alkyne-linked porphyrin metal complexes exhibited remarkably greater changes in the absorption spectra relative to porphyrin building blocks. As a result, alkyne-linked porphyrin metal complexes may find potential applications as materials for optical organic sensors as well as optoelectronic devices.