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ชุดของสารประกอบเชิงซ้อนโลหะของพอร์ไฟรินที่เชื่อมต่อด้วยแอลไคน์ สังเคราะห์ได้จากปฏิกิริยาโซโนกาชิราคับปลิงในเปอร์เซ็นต์ผลิตภัณฑ์ที่น่าพึงพอใจ (11-88 เปอร์เซ็นต์) โดยหมู่เมธิลถูกเลือกใช้เป็นหมู่แทนที่ด้านข้างเพื่อเพิ่มความสามารถในการละลาย ขณะที่หมู่แอลไคน์ถูกต่อที่ตำแหน่งมีโซเพื่อขยายระบบพายคอนจุเกตของพอร์ไฟริน พอร์ไฟรินที่สังเคราะห์ได้ทั้งหมดถูกพิสูจน์เอกลักษณ์ด้วยเทคนิคโปรตอนเอ็นเอ็มอาร์สเปกโทรสโกปี และมัลดิทอฟแมสสเปกโทรเมทรี ทั้งยังถูกวิเคราะห์สมบัติกายภาพเชิงแสงด้วยเทคนิคยูวี-วิซิเบิลสเปกโทรสโกปี และฟลูออเรสเซนต์สเปกโทรสโกปี จากการวิเคราะห์พบว่า ทั้งโลหะไอออนและหมู่แทนที่ที่ตำแหน่งมีโซ โดยเฉพาะอย่างยิ่งหมู่แอลไคน์ ส่งผลต่อสเปกตรัมของการดูดกลืนและการคายแสงของพอร์ไฟริน โดยพอร์ไฟรินที่เชื่อมต่อด้วยแอลไคน์แสดงระบบพายคอนจุเกตที่มากขึ้นเมื่อเทียบกับพอร์ไฟรินตั้งต้น ดังที่ได้แสดงจากผลการดูดกลืนและการคายแสงในช่วงความยาวคลื่นที่สูงขึ้น สมบัติการเกิดโคออร์ดิเนชันของพอร์ไฟรินที่สังเคราะห์ได้ถูกศึกษาเบื้องต้นโดยใช้เทคนิคโปรตอนเอ็นเอ็มอาร์ ยูวี-วิซิเบิล และฟลูออเรสเซนต์ไทเทรชันโดยใช้พิริดีนเป็นลิแกนด์ จากผลของโปรตอนเอ็นเอ็มอาร์ไทเทรชันพบว่า สารประกอบเชิงซ้อนโลหะของพอร์ไฟรินเกิดเป็นสารประกอบเชิงซ้อนกับพิริดีนได้แบบ 1:1 นอกจากนั้น การดูดกลืนแสงในช่วงความยาวคลื่นที่สูงขึ้น และการลดลงของความเข้มสัญญาณฟลูออเรสเซนต์เมื่อเติมพิริดีน ใช้ยืนยันการเกิดสารประกอบเชิงซ้อนระหว่างพอร์ไฟรินและพิริดีนได้

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WUTTICHAI REAINTHIPPAYASAKUL : SYNTHESIS OF ALKYNE-LINKED PORPHYRIN COMPLEXES FOR ORGANIC NANOSENSOR. ADVISOR : ASST. PROF. WORAWAN BHANTHUMNAVIN, Ph.D., 188 pp.

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A series of *meso*-alkyne-linked porphyrin metal complexes has been synthesized by Sonogashira coupling reactions in satisfactory yield (11-88%). The mesityl groups were chosen to use as side chains in order to improve the solubility, whereas the alkynyl groups were linked at *meso*-positions to extend the π-conjugated system of porphyrins. All synthesized porphyrins were characterized by ^{1}H NMR spectroscopy and MALDI-TOF mass spectrometry. Their photophysical properties were also investigated by UV-visible spectroscopy and fluorescence spectroscopy. It has been demonstrated that central metal ions as well as *meso*-substituents, especially alkyne linkers, affected the absorption and emission spectra of porphyrins. The spectroscopic data revealed that alkyne-linked porphyrins exhibited higher π-conjugation compared to porphyrin building blocks resulting in the red shifts in both absorption and emission spectra. Coordination properties of synthesized porphyrins have been preliminarily studied by ^{1}H NMR, UV-visible, and fluorescence spectroscopic titration with pyridine as axial ligand. The ^{1}H NMR titration results indicated the 1:1 complexation of porphyrin metal complexes with pyridine. In addition, the significant red shifts in absorption spectra and decreasing of the fluorescence intensity upon an addition of pyridine also supported the formation of porphyrin-pyridine complexes.

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LIST OF ABBREVATIONS

Å	angstrom
α	alpha
Abs	absorbance
Ar	aryl or aromatic group
β	beta
br	broad (NMR)
Bu	butyl
^{o}C	degree celsius
cm	centimeter
d	doublet (NMR)
dd	doublet of doublet (NMR)
δ	delta
DDQ	2,3-dichloro-5,6-dicyanobenzoquinone
DMF	*N*,*N*-dimethylformamide
DMSO	dimethylsulfoxide
eq.	equivalence
ESI-MS	Electrospray Ionization mass spectrometry
Et	ethyl
g	gram
γ	gamma
h	hour
HOMO	highest occupied molecular orbital
Hz	hertz
i-	iso
J	coupling constant
k	rate constant
K_a	association constant
LUMO	lowest unoccupied molecular orbital
m	multiplet (NMR)
m-	meta
M	molar

$[M]^+$	molecular ion
MALDI-TOF-MS	Matrix Assisted Laser Desorption Ionization Time-of-Flight mass spectrometry
Me	methyl
mg	milligram
MHz	megahertz
min	minute
mL	milliliter
mmol	millimole
mol	mole
m/z	mass per charge ratio
NBS	*N*-bromosuccinimide
nm	nanometer
NMR	Nuclear Magnetic Resonance
o-	ortho
OAc	acetate
p-	para
Ph	phenyl
ppm	part per million
Pr	propyl
py	pyridine
rt	room temperature
s	second
s	singlet (NMR)
t	triplet (NMR)
t-	tertiary
TBAF	tetrabutylammonium fluoride
TFA	trifluoroacetic acid
THF	tetrahydrofuran
TLC	thin layer chromatography
TMS	trimethylsilane or trimethylsilyl
µL	microliter
µmol	micromole
UV	ultraviolet

λ	wavelength
δ	chemical shift
π	pi
%	percent