Synthesis of Extended Structure Chromophores via Cycloaromatization of Porphyrinic Enediynes

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Natural product enediynes have shown high order of anti-cancer efficacy since they undergo Bergman cyclization and form a reactive 1,4-benznoid diradical intermediate, which abstracts hydrogen atoms from the sugar backbone of DNA and causes cell death. Porphyrins and porphyrinic enediynes also demonstrate great applications in various scientific fields such as catalysis, supramolecular chemistry, biomimetic models for photosynthesis, and medical applications such as phototherapeutic agents for photodynamic therapy. Modification of the porphyrin chromophore has many potential applications, primarily when this results in the presence of strong absorption bands in the red and near infrared regions. These extended structure porphyrins are potentially useful in biological systems because human tissue is largely transparent to both red and near infrared wavelengths. Introduction of vicinal alkyne units at the porphyrin periphery extends these properties by modulating the already unusual electronic structure. Bergman cyclization can then be employed to create an extended aromatic molecule. In addition, these porphyrinic enediynes can also be activated in the presence of $PtCl_2$ to generate unique class of phenanthroporphyrins and phenanthro-picenoporphyrin. The preparation and characterization of these molecules will be presented.