

New porphyrin functional molecules with multiple cavities and near infrared absorption

With the support by the National Natural Science Foundation of China, the research group led by Prof. Song Jianxin (宋建新) from the Key Laboratory of Application and Assembly of Organic Functional Molecules, Hunan Normal University, synthesized new π -extended ‘earring’ porphyrins with multiple cavities and near Infrared absorption, which was published in *Angew Chem Int Ed* (2016, 55: 6438—6442, inside cover).

Porphyrin is a favorable candidate to be used in optoelectronic devices, sensors, photovoltaic devices, phototherapy pigments and nonlinear optical materials due to its fascinating π -conjugated system. With the goal of realizing these applications, modification of porphyrin molecular frames and development of new means to manipulate the electronic interactions among porphyrins have attracted much attention in recent years. Porphyrin has a central cavity which can accommodate one metal ion while expanded porphyrin has a much more flexible and bigger cavity which can accommodate one or two metal ions or phosphorous atoms, whereas synthesis of porphyrinoids which could accommodate 3 metals is challenging. β,β tripyrrin-bridged earring porphyrins were synthesized through Suzuki-Miyaura cross coupling of β -bromoporphyrin and diboryltripyrane. β -bromoporphyrin was a key precursor prepared by Song’s group and they used this precursor to assemble β,β directly linked porphyrin nanorings. This finding was also published in *Angew Chem Int Ed* (2014, 53: 11088—11091). The new porphyrinoids possess multiple cavities and can complex with many metal ions. The side cavity of the earring porphyrin can also be taken as a carbaporphyrinoid system, so the ‘ear’ could exhibit some similar properties to carbaporphyrins. The earring metalporphyrins are also alike of porphyrin pincer molecules which may have potential catalytical activity. After metal insertion, the maximum absorption has been up to 1500 nm. The earring porphyrins, after further structural modification, could be used as phototherapy pigments which have remarkable advantages in lower energy absorption and deep penetration but less side effects on normal cells. These earring porphyrins have multiple cavities and can accommodate 2 or 3 metal ions per molecule, which would have potential use in industrial wastewater.

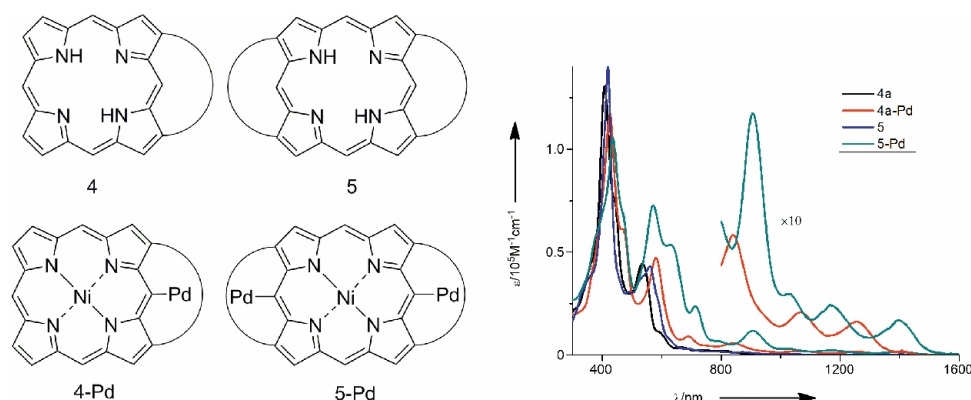


Figure Structures and UV/Vis/NIR absorption spectra of earring porphyrins.