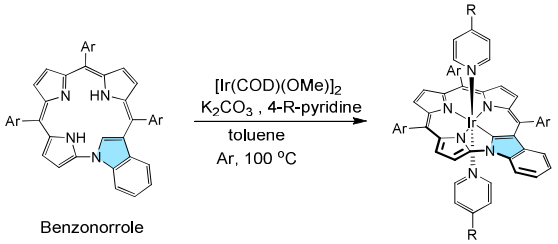
近赤外発光性イリジウム(III)ベンゾノロール錯体の合成と光物性

Synthesis and Photophysical Properties of Near Infrared Phosphorescent Iridium(III) Benzonorrole Complexes

(Grad. Sch. Eng., Kyushu Univ.) Yogesh Kumar Maurya, Takahiro Ishikawa, Yasunori Kawabe, Motoki Toganoh, Masatoshi Ishida, Hiroyuki Furuta

Corrole is a contracted tetrapyrrolic macrocycle containing a directly α,α-linked bipyrrole unit, which have been attracted attentions due to the intrinsic photophysical properties and potency as oxidative catalysts when a redox metal is accommodated. In an effort to seek further unique properties, we have recently developed the synthetic mutants of the corrole, e.g., N-confused corrole and *N*-linked corrole (Norrole).[1] From the view of the coordination chemistry, this structural alteration gives rise to the *CNNN*-type organometallic coordination environment inside the macrocycle. Thus, we have prepared the novel iridium(III) complexes (**1a-e**) using a benzo-annulated N-linked corrole derivative (benzonorrole) and investigated their metal-carbon bonding effect on photophysical properties in this work.



Scheme 1. Synthesis of Iridium(III) benzonorrole complexes **1a-e** with axially coordinated 4- substituted pyridines

The target complexes **1a-e** were prepared by refluxing the toluene solution with iridium(I) metal salt in the presence of the corresponding axial pyridine derivatives in moderate yields. The structures were fully characterized by using various spectroscopies and X-ray crystallographic analysis. A iridium cation is coordinated in a octahedral fashion with two pyridine axial ligands (Figure 1). These complexes showed characteristic aromatic Q-like bands around 600 nm and emit near IR phosphorescences at room temperature. The phosphorescence lifetimes of the emissions were found to be sub-micro second orders (τ_{PL} ~0.5 μs). A iridium corrole congener has been reported as near IR phosphorescent materials (λ_{max} = 800 nm).[2] Compared to the corrole, our iridium benzonorrole complex exhibited the further redshifted near IR phosphorescence beyond 900 nm at wavelengths. The detailed synthesis, structures and effect of the axial pyridine ligands of the complexes will be presented.

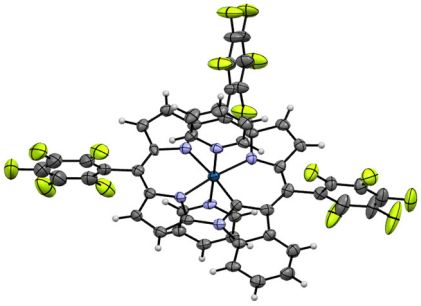


Figure 1. X-ray crystal structure of iridium benzonorrole complex, **1a**

＜参考文献＞

1） H. Furuta *et. al. Angew. Chem. Int. Ed.* **2012**, *51*, 8753-8756.
2） Z. Gross *et. al. J. Am. Chem. Soc.* **2010**, *132*, 9230-9231.

発表者紹介

氏名 Yogesh Kumar Maurya
所属 Grad. Sch. Eng., Kyushu University
学年 DC1
研究室 Furuta Lab