Boron complexes of nitroxide ligands exhibiting three-state redox processes and NIR-II absorption properties

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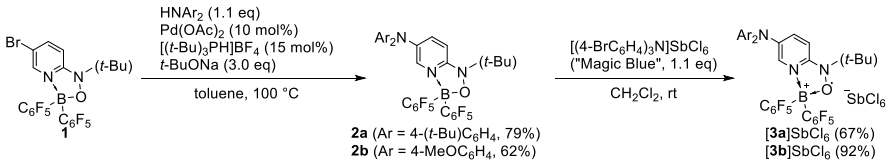
Stable organic radicals have been widely used in the molecular design of the multi-step electron transfer materials, because of their multi-step redox processes involving the open-shell radicals and the corresponding closed-shell ionic species.[1]

Nitroxide complexes **2** were synthesized via the Hartwig-Buchwald coupling reaction of boron complex **1** with diarylamines (**Scheme 1**).[2] Complexes **2** exhibited two-step one-electron oxidation processes attributable to the oxidations to the radical **3** and oxoammonium **4**. Chemical oxidation of **2** with Magic Blue afforded radical cation complexes **3**, which exhibited strong NIR-II absorptions extended to 1300 nm.



Scheme 1. Synthesis of the boron complexes.

References

1. J. A. Bogart, H. B. Lee, M. A. Boreen, M. Jun, E. J. Schelter, *J. Org. Chem.* **2013**, *78*, 6344-6349.
2. M. Nakamura, R. Hyakutake, H. Fukumoto, T. Agou *et al., Dalton Trans.* **2022**, *51*, 13675-13680.

Tomohiro Agou received his PhD degree from the University of Tokyo in 2007 under the supervision of Prof. Takayuki Kawashima. He joined the group of Prof. Norihiro Tokitoh at the Institute for Chemical Research in 2009 and was promoted to Associate Professor at Ibaraki University in 2016. In 2023, he was promoted to Full Professor at the University of Hyogo. His main research interests are the development of functional organic compounds utilizing main group elements as well as the fluorine-containing polymer materials.

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