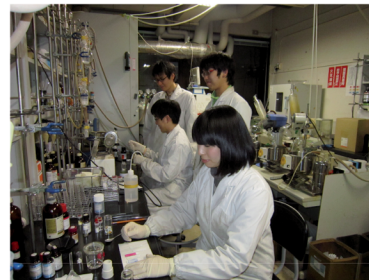
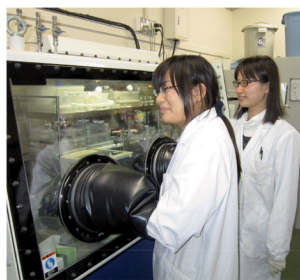


Synthesis and Redox Properties of PNP Pincer Complexes Based on *N*-Methyl-4,4'-bipyridinium



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Invited for the cover of this issue is the group of Yoshiaki Nishibayashi at The University of Tokyo, Japan. The cover image shows the synthesis of novel “metalloviologens” bearing PNP pincer ligands based on *N*-methyl-4,4'-bipyridinium. These complexes are stable toward two steps of single electron transfer, where *p*-quinoid-type complexes play a key role.

In one word, how would you describe your research?

Developing! Our ultimate goal in this project is the construction of a stable redox system for efficient reduction of water and CO₂ under photoirradiation.

What is the most significant result of this study?

A variety of viologen analogues have been synthesized until now, and significant interest has also been focused on *N*-substituted-4,4'-bipyridyl groups bound to a transition metal, which are called “metalloviologens”, because the interactions between metal centers and π -conjugated 4,4'-bipyridyl systems are expected to affect optical and magnetic properties and to promote unique reactions. Although various transition metal complexes having *N*-alkyl or *N*-aryl-4,4'-bipyridinium groups as ligands have been synthesized, there is a limited number of applications of metalloviologen skeletons. Pyridine-based PNP pincer ligands have been known to work as rigid tridentate ligands and have been introduced into various transition metal complexes, which were reported to show unique stoichiometric and catalytic reactivities. In this study, the most significant result is our success in the synthesis of “metalloviologens” combined with PNP pincer ligands and the electronic studies on these compounds.

What other topics are you working on at the moment?

One of the major projects in our group is the development of the nitrogen fixation process under ambient conditions. The Haber–Bosch process is known to be the conventional method for the conversion of atmospheric molecular nitrogen into ammonia. The problem with the Haber–Bosch process is the huge amount of energy required. Since we succeeded in the development of Mo-catalyzed transformation of molecular dinitrogen into ammonia under ambient reaction conditions in 2011, we have continuously been studying the development of efficient systems for the catalytic nitrogen fixation process. The final goal of our group is the realization of an “ammonia society”, where ammonia will be used as the source of energy and hydrogen instead of fossil fuels such as petroleum, coal, and natural gas. Toward this ultimate goal,

our next target is the development of a novel method for the synthesis of ammonia from molecular dinitrogen and water by the use of light energy.

