

Photophysical Properties of Aluminum Dihydride Complexes based on β -Diketiminato Ligands by Substituent Effect

(Graduate School of Engineering, Kyoto University)

○Keisuke Suwa, Shunichiro Ito, Kazuo Tanaka

Keywords: β -diketiminato; Aluminum; Phosphorescence; Substituent effect

Solid-state luminescent molecules have attracted great deal of attention as key components of luminescent devices such as organic light-emitting diodes, organic lasers, and chemosensors. Typical luminescent molecules usually lose their efficient luminescence at the solid states due

to strong intermolecular interactions. Meanwhile, we have reported that a series of β -diketiminato complexes of the group 13 elements show dramatic emission enhancement by crystallization compared to their solutions, namely crystallization-induced emission (CIE). Furthermore, these molecules also exhibit phosphorescence at 77 K.^{1,2} Consequently, these complexes could serve as robust scaffolds for achieving functional luminescent materials. However, structure–property relationships in their photophysical properties have not been clarified completely. Herein, we synthesized a new series of aluminum dihydride complexes with different aromatic substituents (Scheme 1) and evaluated their photophysical properties.

All aluminum complexes showed the CIE property at room temperature like previously reported β -diketiminato complexes (Figure 1a). Photoluminescence spectra of their solutions at 77 K were composed of two distinct bands, fluorescence and phosphorescence (Figure 1b). The relative phosphorescence intensity to fluorescence increased in the order of Dipp < DMP < Mes < MeO. In the presentation, we will discuss such photophysical properties in detail.

Scheme 1. Synthetic scheme of aluminum dihydride β -diketiminato complexes

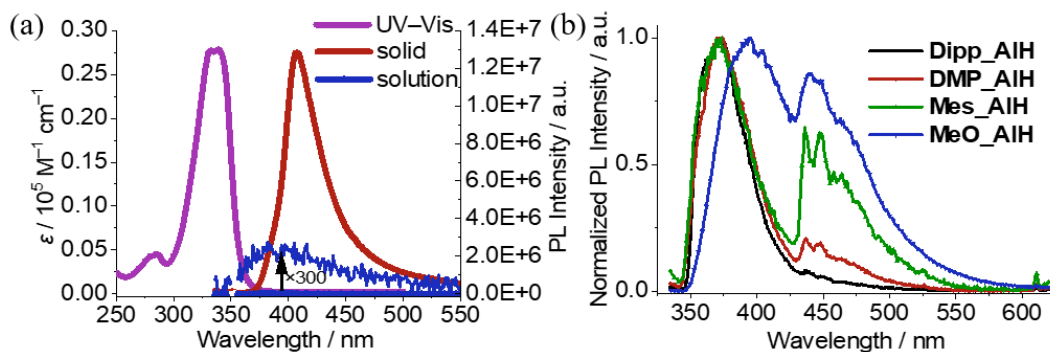
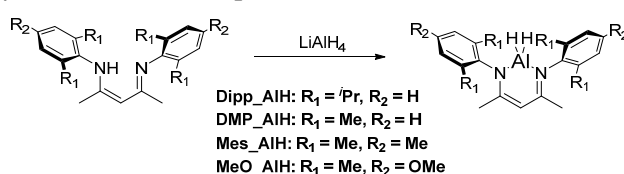


Figure 1. (a) UV–vis absorption and photoluminescence (PL) spectra of **MeO_AIH** in a 2-methylpentane solution and the solid states. (b) Normalized PL spectra of β -diketiminato aluminum complexes in 2-methylpentane solutions (1×10^{-5} M) at 77 K.

References

- (1) Yoshii, R.; Hirose, A.; Tanaka, K.; Chujo, Y. *J. Am. Chem. Soc.* **2014**, *136*, 18131–18139.
- (2) Ito, S.; Tanaka, K.; Chujo, Y. *Inorganics* **2019**, *7*, 100.