

Control of Crystal Structure in Discotic Trinuclear Gold(I) Complexes by UV Irradiation

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Gold complexes in aggregates exhibit strong luminescence due to aurophilic interactions. It has been reported so far that this interaction was amplified in excited states. We have reported the photophysical properties of discotic trinuclear Au(I) complexes (Figure 1), and that their emission colors varied depending on the aggregated structure. Considering that the aurophilic interaction is enhanced in the excited state, we can expect that the crystal structure can be controlled by photoexcitation.

In this study, we investigated crystal structure of Au complexes formed under photoexcitation to understand the mechanism behind it. We prepared single crystals of the complexes by recrystallization from THF under UV irradiation at 254 nm. The crystals obtained under UV irradiation exhibited different luminescence behavior from those obtained in the dark. The single-crystal X-ray structural analysis revealed that both crystals showed the completely different structure (Figure 2). We found an increase in the number of the sites of aurophilic interaction in the crystals obtained under UV light irradiation. Based on these results, we conclude that crystallization under UV light irradiation to enhance the aurophilic interaction induced the different crystal structure.

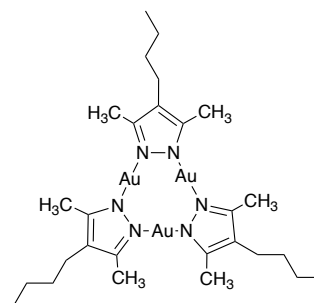


Figure 1. Chemical structure of discotic trinuclear gold(I) complexes.

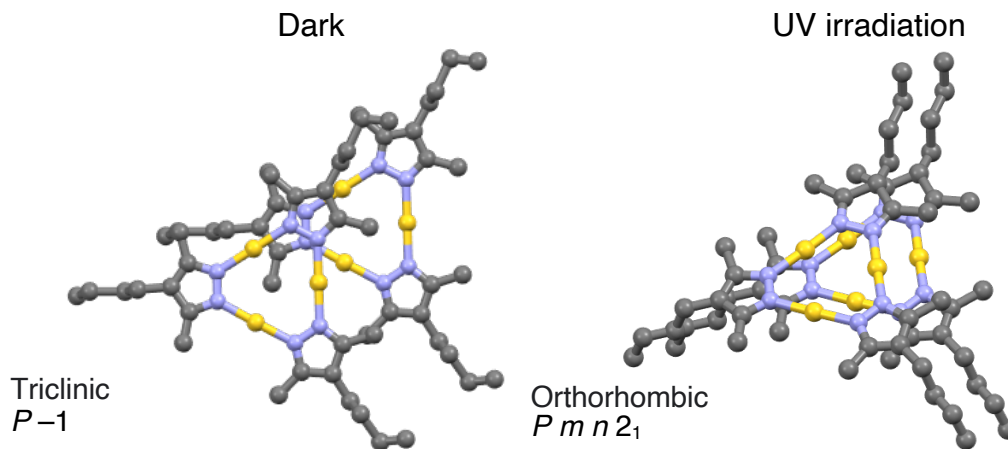


Figure 2. Structure of Au-complex crystals obtained by recrystallization under dark and UV irradiation.

- 1) Seki, T.; Sakurada, K.; Muromoto, M.; Ito, H. *Chem. Sci.* **2015**, 6, 1491.
- 2) Y. Kuroda, *et al.*, *Commun. Chem.*, **2020**, 3, 139.