# Aggregation-Induced Room-Temperature Phosphorescence from Mesogenic Gold(I) Complexes

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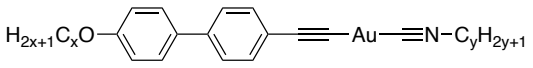
**Keywords**: Aggregation-Induced Emission; Room-Temperature Phosphorescence; Gold Complexes.

Luminescent organic materials generally show efficient luminescence only in dilute solutions, and the emission is quenched by aggregation. This phenomenon is well known as the aggregation-caused quenching (ACQ), which has become the main concern for practical light-emitting applications.[1] In 2001, Tang *et al*. introduced an opposite phenomenon to ACQ, termed aggregation-induced emission (AIE), in which the aggregation of molecules significantly enhanced the emission.[2] Gold(I) complexes have been noticed as a type of AIEgens, as their luminescence is significantly enhanced in the solid-state. Au–Au (aurophilic) interactions in gold complexes play an important role not only in inducing efficient luminescence from aggregates, but also controlling the luminescence behaviour.

In the present study, we designed and synthesized a series of rod-like gold(I) complexes having mesogenic biphenylethynyl ligand and an isocyanide ligand. Here, we varied the length of flexible alkoxyl or alkyl chains as shown in Figure 1, and investigated their AIE properties and liquid crystalline (LC) nature. All synthesized gold(I) complexes are AIE-active where, in crystal, strong room-temperature phosphorescence (RTP) with relatively high quantum yields of up to 23% was observed even in air. AIE study also revealed that such strong RTP is greatly affected by crystal quality and aggregated structure (e.g., Au–Au distance) that depends on crystal size and/or crystal growth process. Moreover, B3-5 complex with longer flexible chains showed LC phase where RTP can be observed.




**B*x-y*; (*x*,*y*) = (2,4), (2,5), (3,5)**

**Figure 1.** Molecular structures of gold complexes used in this study.

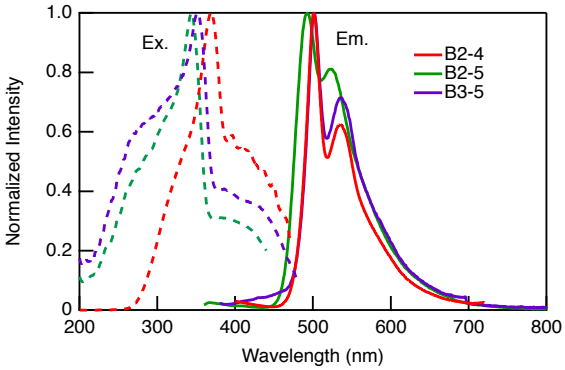



**Figure 2.** Emission spectra of gold complexes in the crystal

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