Mechanically Induced Structural Transformations in Luminescent Gold Complexes

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In recent years, the mechanical properties of organic and organometallic compounds and their associated optical property changes have become an important topic among researchers. In particular, since 2008, our research group has focused on the mechanical behavior of Au(I)-isocyanide complexes and the associated changes in their luminescent properties. As a result, we have discovered several gold isocyanide complex crystals with multiple polymorphs and luminescent mechanochromism. We have reported phenomena such as single-crystal-to-single-crystal phase transitions due to mechanical stimuli or crystal contacts, reversible single-crystal-to-single-crystal phase transitions induced by mechanical stimuli and solvents, and mechanochromism with near-infrared emission. In addition, these gold complexes have found ferroelasticity with thermal phase transition. Such a variety of crystal structures and accompanying changes in luminescence color are due to the switching of aurophilic interactions, CH-π interactions, and other interactions in the crystal structure. This presentation will discuss their semi-rational design attempts.

Figure 1. Mechanically Induced Structural and Optical Property Changes of Au(I) Complexes