A molecular crystal of a gold complex exhibiting reversible shape memory effects with luminescent color changes

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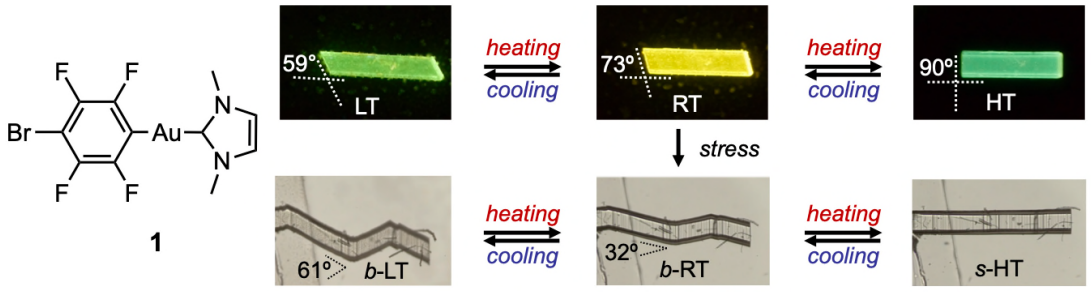
Shape memory effect is referred to as the phenomena that mechanically deformed materials (i.e., alloys or polymers) can recover their original shape upon temperature change. Shape memory alloys or polymers attracted attention because of their scientific and technological significance. Recently, the first example of the shape memory effect in the organic molecular crystal was reported.[1)] However, such a molecular crystal does not exhibit luminescent properties. If intrinsically luminescent molecules show shape memory effect in their crystalline states, intriguing chromic behaviors can be observed upon deformation/recovery process of the morphologies.[2)] Here, we report that molecular crystals of a gold complex **1** exhibit reversible shape memory effect with luminescent color changes.

Crystal samples of a gold(I) complex **1** (denoted as an RT phase at room temperature) shows a reversible phase transition to LT or HT phases upon cooling or heating, respectively. These thermal phase transitions lead to the alterations of the luminescence colors and macroscopic morphologies. The RT crystal shows plastic bending upon applying mechanical force. Intriguingly, these mechanically bent crystals showed a reversible shape memory effect with luminescent color changes upon heating or cooling. We performed differential scanning calorimetry (DSC) analyses, single-crystal X-ray structural analyses, and a series of spectroscopic measurements to evaluate the reversible shape memory effects of **1** with luminescent color changes. Thus, we will discuss the origin of the intriguing stimuli-response behavior of **1**.



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