Contribution ID: **61** Type: **Poster Only**

Gold Thiolate Coordination Polymers as Potential Phase Change Materials for Data Storage

Coordination polymers (CPs) are emerging functional inorganic-organic hybrid materials formed by the coordination bond between a metal ion or cluster and an organic linker. Phase Change Materials (PCMs) can undergo reversible transitions between an amorphous phase to one or more crystalline polymorphs through external heating. CP-PCMs, with distinct optical and electrical properties that depend on the structure of each polymorph, are proposed as data-storage materials.¹

Recently, Au(I)-thiolate CPs have emerged as a substitute for inorganic PCMs in data storage applications due to their low operating temperature (< 200deg;C) and flexibility.² These Au(I)-thiolate CPs exhibit an amorphous-to-crystalline and subsequent polymorphic phase transition with increasing temperature. With gentle grinding, the amorphous phase is recovered.² The difference in the photoluminescence of each phase is proposed as an optical signal to store data. To the best of our knowledge, Au(I)-thiolate PCMs with a dithiol molecule as the bridging ligand have not been reported yet.^{2,3}

We report the synthesis of a novel Au(I)-thiolate CP incorporating both biphenyl-4,4′-dithiol (BDT) and 4-methylbenzenethiol (MBT) molecules as bridging ligands. We are studying its reversible tranformations from amorphous to various crystalline phases, focusing on the change in luminescence and electrical properties. For comparison, we have also synthesized the end-member Au(I)-thiolate CPs with a single linker, either BDT or MBT. Detailed investigation of phase transitions and resultant changes in photoluminescence and conductivity in these dithiol-based Au(I)-thiolate CPs will expand the class of CP-PCMs as potential materials for next-generation data storage devices.

Reference
(1) Zou, R et al., *Adv. Mater.* **2022**, *34* (41), 2202457.
(2) Demessence, A et al., *Angew. Chem.* Int. Ed. **2022**, *61* (14), e202117261.
(3) Demessence, A et al., *ACS Appl. Mater. Interfaces* **2024**, *16* (17), 22512–22521.

Topical Area

Hard matter: quantum, electronic, semiconducting materials

Author: Dr MURALI, Meenu (Postdoctoral Research Associate, Department of Chemistry , Washington University in St. Louis)

Co-author: Prof. POWDERLY, Kelly M (Department of Chemistry, Washington University in St. Louis)

Presenter: Dr MURALI, Meenu (Postdoctoral Research Associate, Department of Chemistry , Washington University in St. Louis)