

## Novel Chemical Compounds Support Excess Copper Removal in Biological Systems (#8151)

*A preorganized phosphine sulfide-stabilized phosphine (PSP) framework that displays unique capabilities for binding with copper (Cu) and shows high potential for drug candidacy*

Researchers at Georgia Tech have developed a new family of chelating agents—chemical compounds that bind with metals to help metabolize them out of the body—as a potential pharmaceutical treatment for the accumulation of excess copper, like in Wilson’s disease. In creating these chemical ligands, researchers established several synthetic methods for the reagents’ synthesis and also characterized their structure and copper affinity through multiple techniques, including ultraviolet (UV) imaging, X-rays, and crystallography.

The two primary characteristics that make these PSP chelating agents unique are (1) their use of auxiliary phosphine sulfide groups and (2) the geometric pre-organization of the molecules. Because of these distinctive qualities, the novel PSP reagents possess a robust coordinating ability for Cu(I)—the +1 oxidation state of copper—as well as a high level of specificity that keeps them unaffected by other essential metals in the body.

### Benefits/Advantages

- **Powerful:** Displays an affinity for copper that is unprecedented among synthetic ligands, with a complex stability constant of  $\log K = 20.0$
- **Specific:** Functions without interference by other metals in the body
- **Effective:** Possesses a strong copper coordinating ability, even in the complex chemical environments of different biological systems

### Potential Commercial Applications

- Pharmaceuticals
- Metallomics

### Background/Context for This Invention

Copper has a small but important presence in the human body, supporting the production of red blood cells as well as maintaining nerve cells and the immune system. Too little or too much copper, however, could be highly detrimental for an individual’s health. In Wilson’s disease, an accumulation of copper in the liver, brain, and other vital organs can lead to complications like liver failure. Treatments using chelating agents

can remove excess copper from the body and then also maintain healthy copper levels throughout an individual's life. In comparison to other chelating agents currently in use to treat Wilson's disease, this PSP family developed at Georgia Tech displays an exceptional level of specificity and high degrees of affinity.

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**More Information**

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**Publications**

**For more information about this technology, please visit:**

<https://licensing.research.gatech.edu/technology/novel-chemical-compounds-support-excess-copper-removal-biological-systems>

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot

