

**WIU CENTENNIAL HONORS COLLEGE**  
**Thomas E. Helm Undergraduate Research Day 2022**

**Abstract**

Poster

Major Chemistry (pharmacy)

Faculty Mentor: John Determan

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**Analyzing Illicit Drugs Using Copper Nanoparticles**

**Lillie Purcell**

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This research project seeks to use nanoparticles to detect the presence of illicit drugs such as a methamphetamine analog. Nanoparticles have a diameter of less than 100 nanometers. Coinage metal like copper, silver, and gold nanoparticles are relatively stable with high refractive indices. These characteristics allow for a visual color change to detect the drug. The detection of illicit drugs is helpful in the forensic field and can further aid law enforcement in identifying unknown substances in an efficient manner. Gold nanoparticles have been shown to be able to detect drugs in previous studies but are costly. Alternatively, using a different metal such as copper with similar chemical and optical properties to gold, can allow for the detection of a methamphetamine analog while also reducing the cost.

The detection of methamphetamine is performed using the colorimetric test. Metal nanoparticles have vivid visible colors due to their high refractive indices. This makes them susceptible to change due to interaction with other chemicals, such as illicit drugs. Aptamers are oligonucleotides or peptide molecules that selectively interact with a drug of interest. The aptamer will be used to enhance the interaction of the nanoparticles with a methamphetamine analog. Interaction with the drug of choice causes a change in the surface structure of the nanoparticles. As a result, the change in structure will cause a visible change in the color of the aptamer coated nanoparticles.