

**Centennial Honors College
Thomas E. Helm Undergraduate Research Day 2024**

ABSTRACT

Major: Forensic Chemistry

Poster

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PVP Capped Gold Nanoparticles for the Detection of GBL

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A major issue in society is drug use. One drug that poses a great threat to young women is gamma-butyrolactone (GBL) since it is a precursor to gamma-hydroxybutyric acid (GHB), the date-rape drug. GHB and GBL are both designated as Schedule I drugs and have similar side effects; however, GBL has longer lasting and faster acting side effects. It is important that a portable, reliable, and efficient test be created to detect GBL because it metabolizes quickly. Current methods for detecting GBL (enzyme-linked immunosorbent assays, high-performance liquid chromatography, and gas chromatography-mass spectrometry) require expensive instruments, a background in chemistry for result interpretation, and are time consuming. Metal polyvinylpyrrolidone (PVP) nanoparticles can be used to create the desired portable, reliable, and efficient test. Gold nanoparticles have unique physicochemical properties and optical properties. Adding PVP helps stabilize and provide additional fluorescence for the nanoparticles. A DNA aptamer is used to ensure that the test is molecule specific. Since aptamers are biologically specific and only interact with a target drug, this test will be specific to GBL. A series of surface modifications allow DNA linkers and aptamers to be attached to the surface of the nanoparticles. A change in fluorescence is observed when the modified Gold-PVP nanoparticles interact with a target drug. GBL can be detected by measuring the change in fluorescence.