

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

**Abstract**

Poster

Major Forensic Chemistry

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**Detection of Illicit Drugs using Silica Nanoparticle as Fluorescent Biosensors**

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Drug trafficking has become one of the most problematic illegal businesses in the world due to illicit drug use and abuse. Illicit drugs are metabolized quickly and cause critical damage to a person's neurological and cardiovascular systems. This makes a rapid, cost effective, and analytical technique for detecting illicit drugs for law enforcement, forensic science authorities, and medical diagnostics to use in their work necessary. Gold nanoparticles have been used in previous research in the detection of illicit drugs, this is due to their sensitivity in their interactions with drugs. However, gold nanoparticles are not the most ideal due to a high associated production cost. Silica nanoparticles are a more cost effective and abundant option than coinage metals. The procedure of the production of silica nanoparticles is based on the procedures of Zhixue Zhou, Yan Du, and Shaojun Dong. The nanoparticles have a hollow core with biological fluorescent dye, which is Fluorescein Isothiocyanate Isomer I. In this research, illicit drugs are detected using aptamers attached to the surface of silica nanoparticles. An aptamer is a synthetic single-stranded DNA or RNA molecule that is used to interact with a target molecule. The fluorescence is blocked during the interaction with drug molecules and the change in fluorescence is measured using fluorescence spectroscopy. The change of fluorescence is used to indicate if there are illicit drugs present.