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Abstract

Poster

Major: Forensic Chemistry

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Illicit Drug Detection with the Use of Silica Nanoparticles as Fluorescent Biosensors

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Illicit drug use and addiction is an international crisis. Illicit drugs can do irreparable harm to the user's cardiovascular and neurological systems. After only a few short hours, illicit drugs can become undetectable due to being metabolized quickly by the body. This increases the need for an effective and reliable onsite drug test that could be utilized by police officers and first responders. Other current techniques used for drug testing are enzyme-linked immunosorbent assay, gas chromatography-mass spectrometry, high-performance liquid chromatography, and Raman instruments These techniques are known to be complex and time consuming. Also, current instruments are not easily portable.In previous research studies, gold nanoparticles that were capped with an aptamer were used to detect the presence of illicit drugs. This was conducted through the use of colorimetry. In our current study, silica nanoparticles are used because they are inexpensive, readily accessible, and abundant. A procedure described by Zhixue Zhou, Yan Du, and Shaojun Dong will be utilized in this study for the production of the silica nanoparticles. The silica nanoparticle will be filled with a biological fluorescent dye, specifically Fluorescein Isothiocyanate Isomer I. The silica nanoparticles will then be capped with DNA aptamers. The biologically specific DNA aptamers will only be able to interact with the target drug and not the legal antilogs of the target drug. The fluorescence of the capped nanoparticles will quench when interacted with the target drug. The composition of the particle will be verified with infrared spectroscopy and TEM imaging.