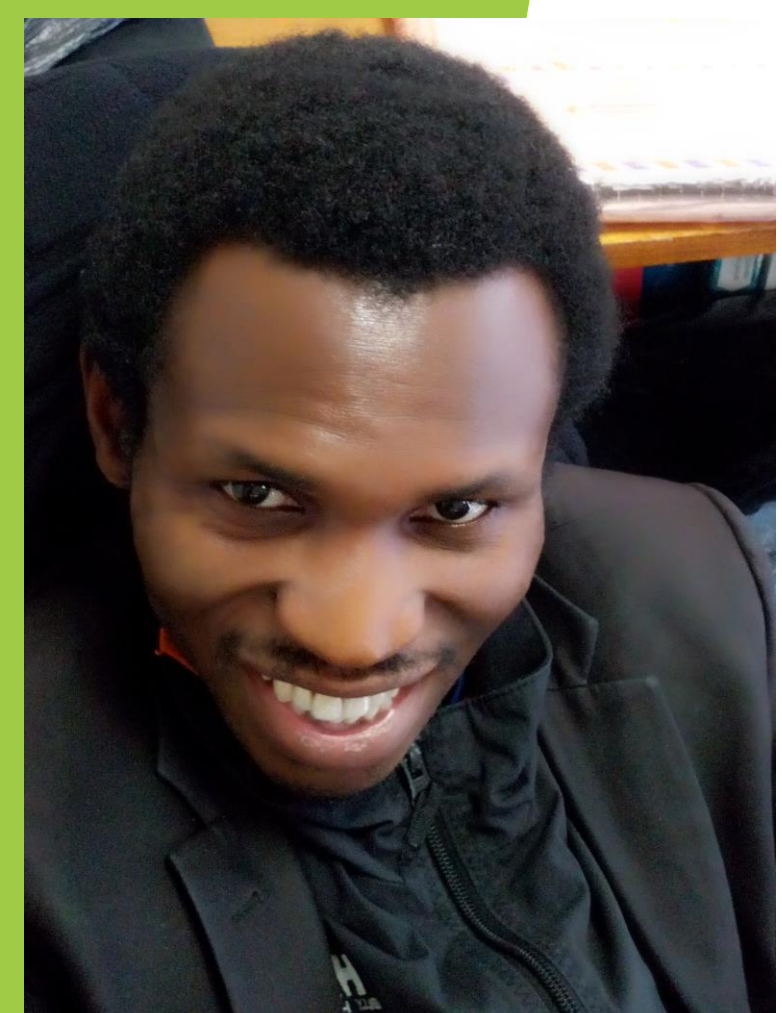




# Affordable Electrochemical Sensor for Cyanide, Pyrrole and Glucose Sensing.

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## Background

Ferrocyanide is a common water pollutant from the winemaking industries and science laboratory environment. Pyrrole is used as a precursor for many pharmaceutical products. Glucose is an important biomarker for diabetes. The presence of these chemicals in water poses a risk to the health and sustainability of humans and the environment.

## Alignment with SDGs

Industrial electrochemistry has enabled the opportunity to achieve a good healthy lifestyle by providing a pathway to the availability of smart monitoring devices such as hand-held point-of-care equipment used for monitoring levels of targeted disease/hormone biomarkers in water, body fluid and environmental media. Monitoring levels of disease-causing materials and their associated derivative compounds in water, to safeguard against diseases, is one of the essential tools required to achieve the sustainable development of clean water and sanitation goals.

## Problem Statement

Both old and new electrode technologies are either expensive, sometimes require toxic purification agents for maintenance, depend on specialized training skills to function or are insensitive to detecting new potential pollutants.

## Aim / Solution

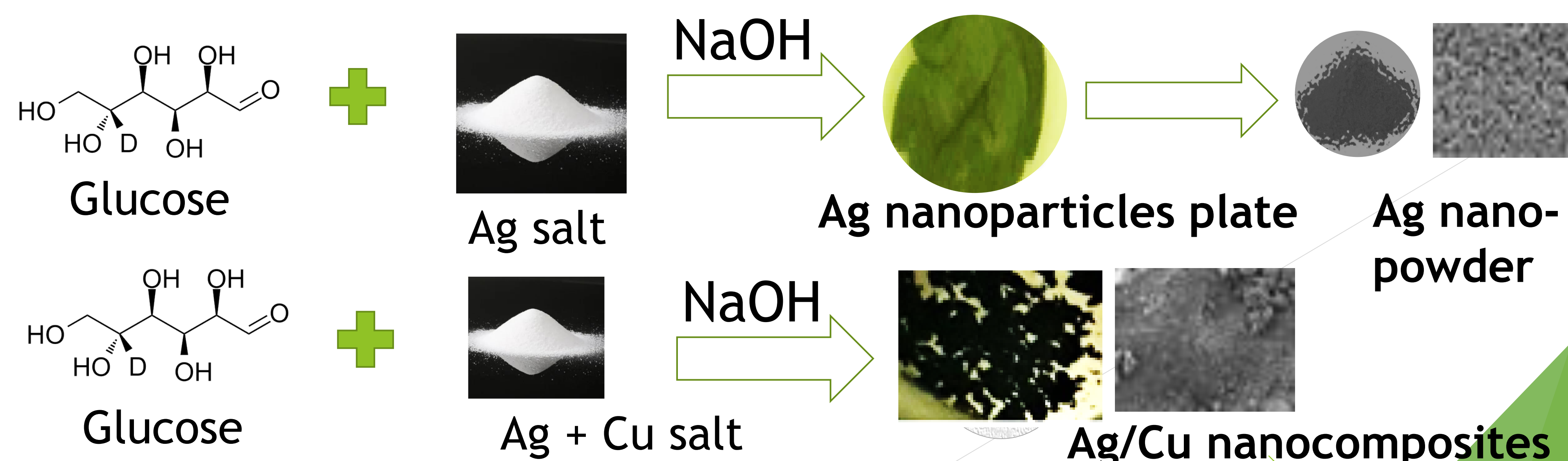
Affordable materials and sustainable analytical methods are needed to circumvent sensing challenges.

### Possible materials

Silver nanoparticles are unique metallic powder which have been proven to exhibit sufficient electronic properties, feasible for diagnostic / sensing purposes.

### Methodology - Room temperature production of silver nanocomposite electrodes

Redox precipitation, coprecipitation, hydrothermal, solvothermal, mechanochemical, laser/ microwave-assisted techniques, green synthesis, etc



## Objectives

Synthesis and characterization of materials

Electrode fabrication

Lab application

Industrialization

other materials

Conductive pencil, wax carbon, fruit carbon, paper, graphite powder, nanocomposites and polymers

graphite

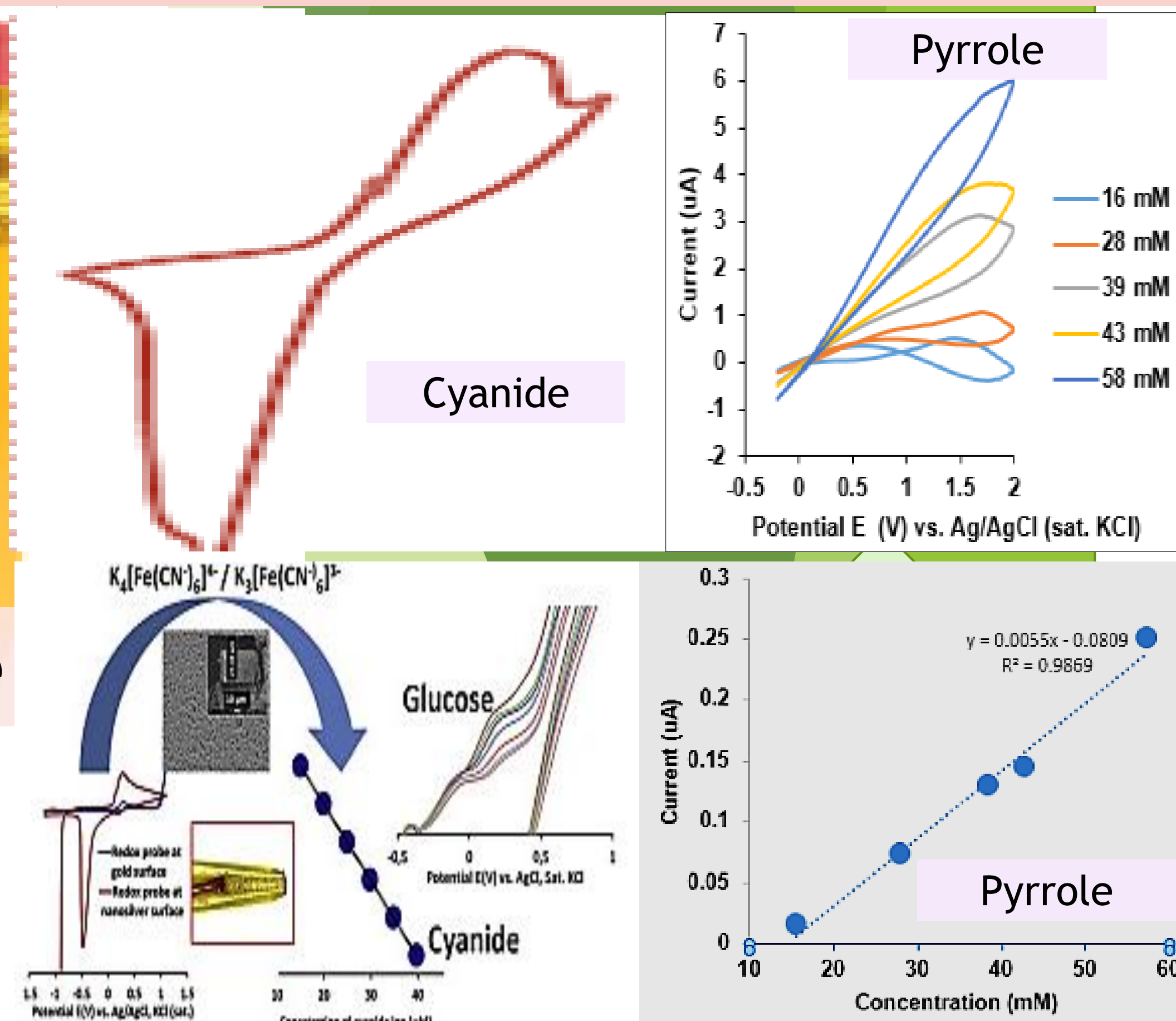
Future work

Industrialization

Conclusion

LOD for cyanide:  $68 \times 10^{-9} \text{ M}^*$ ;  $R^2 = 1.0000$ .  
LOD for glucose:  $813.3 \times 10^{-6} \text{ M}^{**}$ ;  $R^2 = 0.9835$ .  
LOD for pyrrole:  $4.725 \times 10^{-3} \text{ M}^{***}$ ;  $R^2 = 0.9976$ .  
\*Range: 14-40  $\mu\text{M}$ . \*\*Range: 1-7 mM, \*\*\*Range: 20-51 mM range).

## Lab Application (Results & Discussion)



## Electrode fabrication

Drop casting, spraying, spin coating, etc

polymer, solvent, viscosity adjusting agent

## Characterization

CV, SEM, UV-VIS, FTIR, XPS, XRD, EDS

References

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