NANO-STRUCTURING OF CARBON ELECTRODES FOR DEVELOPING AN ELECTROCHEMICAL APTASENSOR

Monalisha Ghosh Dastidar, Krishnan Murugappan, David Nisbet, Christopher Nolan, Antonio Tricoli

Research School of Engineering, The Australian National University, Canberra, ACT 2601, Australia

Monalisha.GhoshDastidar@anu.edu.au

MOTIVATION

- Glycated albumin (GA), normally expressed relative to total human serum albumin (HSA) can be used as a biomarker of glycaemia for diabetes screening programs and, for people with established diabetes, monitoring of glycaemic control.
- Nano-structuring commercially available and inexpensive screen printed carbon electrodes (SPCEs) with gold nanoparticles (AuNPs).
- Develop an electrochemical aptasensor for the selective detection of glycated albumin.

EXPERIMENTAL

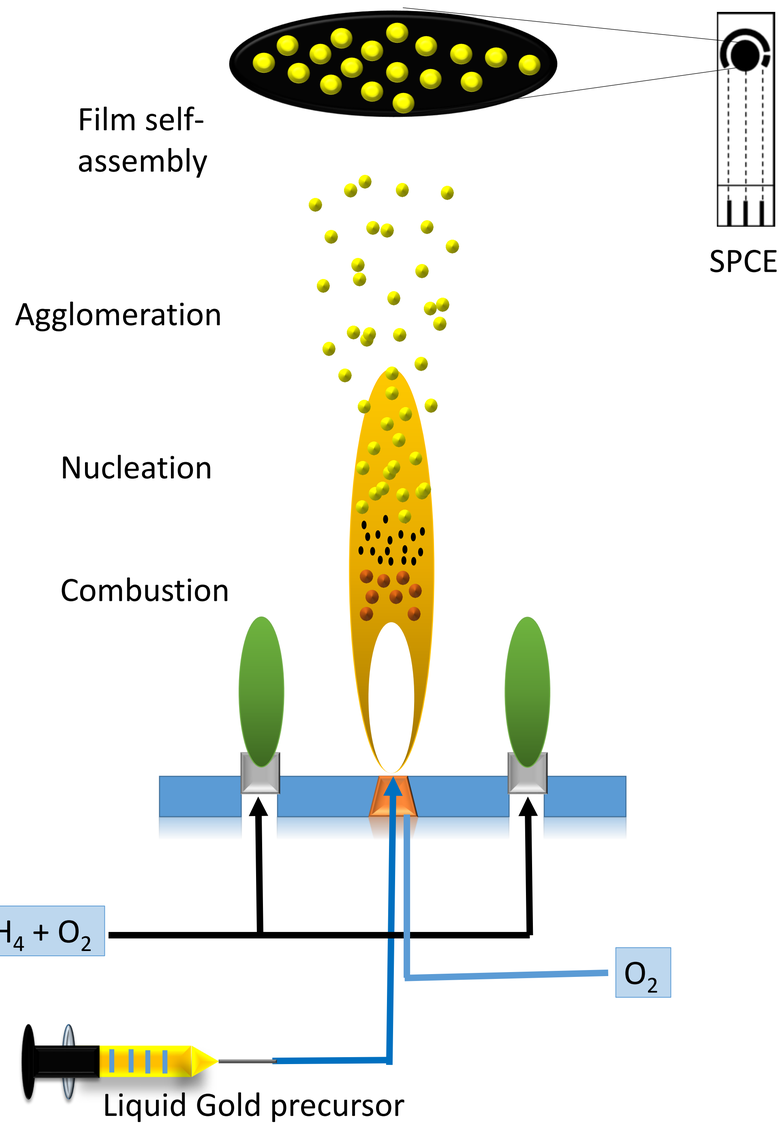

Figure 1: Schematic representation of AuNP deposition using Flame spray pyrrolysis

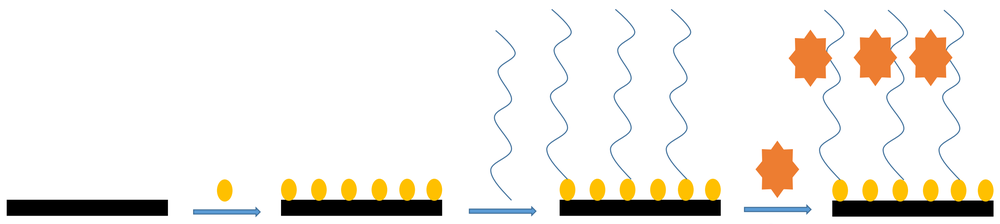

Figure 2: Schematic representation of aptasensor fabrication

CHARACTERIZATION

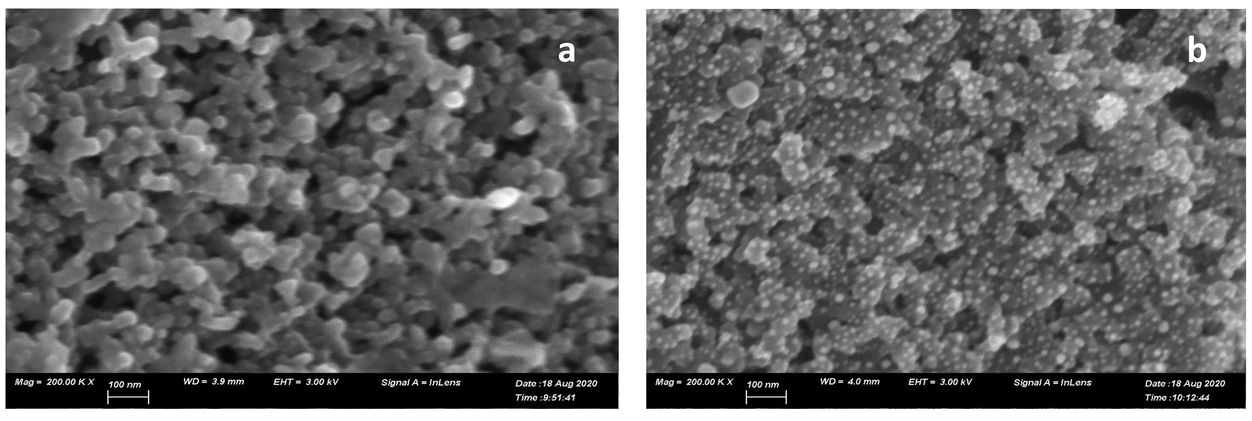

Figure 3: Scanning electron microscopic images of (a) Bare SPCE and (b) AuNP/SPCE

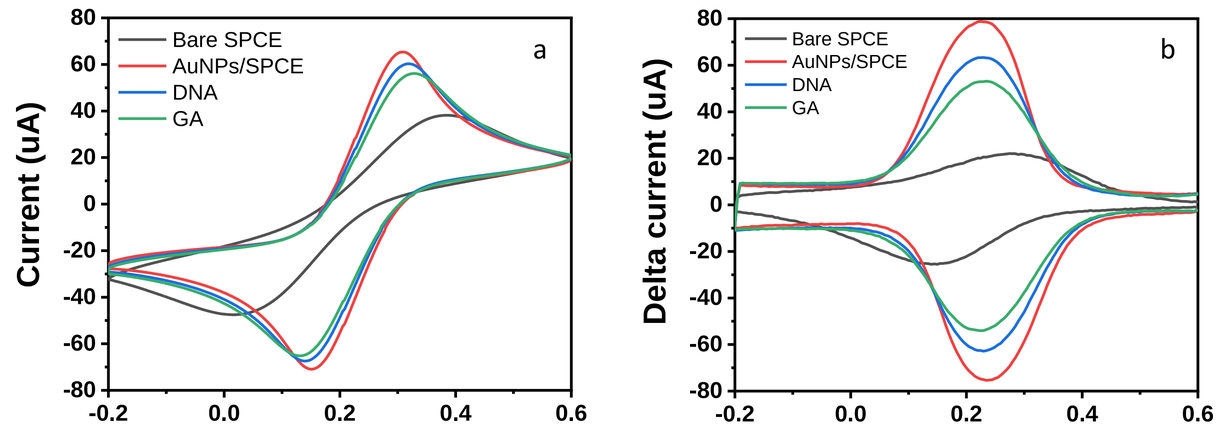

Figure 4: Electrochemical characterization (a) Cyclic voltammetry and (b) Differential pulse voltammetry of stepwise electrode modification in 5 mM ferricyanide solution

RESULTS

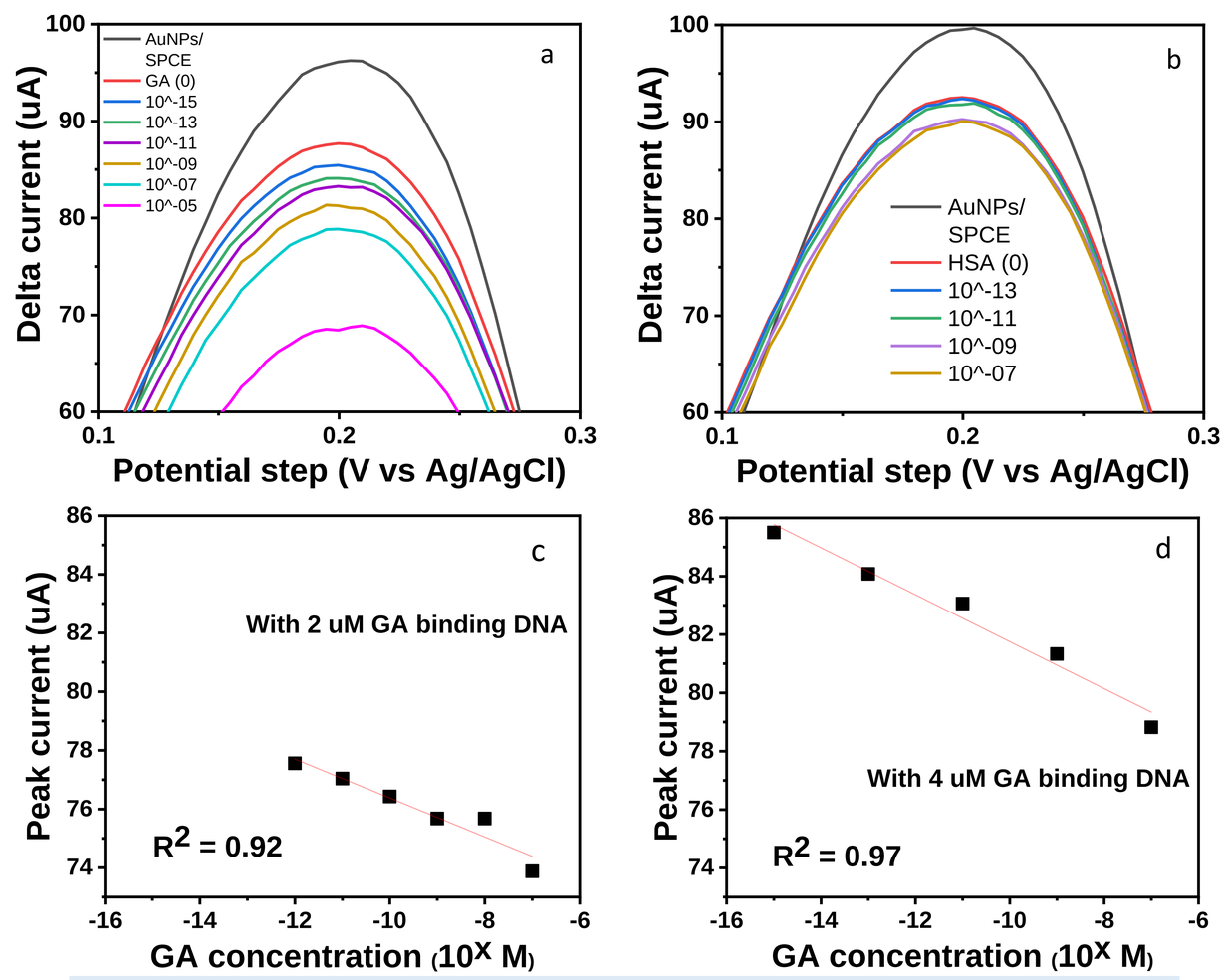

Figure 5: Differential pulse voltammetry of (a) different concentrations of glycated albumin and (b) different concentrations of human serum albumin; calibration plots of glycated albumin with (c) 2 uM GA binding DNA and (d) 4 uM GA binding DNA

CONCLUSION

- Gold nanostructures on SPCEs were optimized to successfully design a platform for biosensor fabrication
- The AuNP modified SPCEs were used to immobilize the optimized amount of thiol-modified glycated albumin binding DNA aptamer via the formation of Au-S bond
- Glycated albumin was successfully detected over human serum albumin

ACKNOWLEDGEMENT

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REFERENCE

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[2] Sasinee Bunyarataphan et al. Electroanalysis 2019, 31, 2254-2261