

# NANO-STRUCTURING OF CARBON ELECTRODES FOR DEVELOPING AN ELECTROCHEMICAL APTASENSOR

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Diabetes mellitus is one of the most deadly diseases around the world besides different types of cancers, cardiac diseases, and respiratory diseases with over 280 people affected per day in Australia alone [1]. This has led to the discovery of various biomarkers associated with the glycaemic control of diabetes. One such biomarker is glycated albumin (glycation of human serum albumin) which is normally expressed relative to total human serum albumin [2]. In this work, we have tried to nano-structure commercially available and inexpensive screen printed carbon electrodes (SPCEs) in order to develop an electrochemical aptasensor for the selective detection of glycated albumin. At first, the formation of gold nanostructures on SPCEs by using flame spray pyrolysis has been optimized to reduce the capacitive current of the electrode and capture the maximum amount of aptamer. The optimized working electrode surface has been used to successfully detect different concentrations of glycated albumin within a clinically relevant range. Cyclic voltammetry (CV) and differential pulse voltammetry (DPV) were used to electrochemically characterize the nanostructured electrodes and also measure the analytical utility, via the redox mediator ferricyanide ( $\text{Fe}(\text{CN})_6^{3-}$ ). The linear range, sensitivity and selectivity of this aptasensor will be presented during the symposium.

## References:

- [1] E. Sainsbury, Y. Shi, J. Flack, S. Colagiuri, and S. Lee, "Burden of Diabetes in Australia : It's time for more action," no. July, pp. 1–22, 2018, [Online]. Available: [www.sydney.edu.au/medicine/research/units/boden/recently-published.php](http://www.sydney.edu.au/medicine/research/units/boden/recently-published.php).
- [2] K. Yoshiuchi *et al.*, "Glycated albumin is a better indicator for glucose excursion than glycated hemoglobin in type 1 and type 2 diabetes," *Endocr. J.*, vol. 55, no. 3, pp. 503–507, 2008, doi: 10.1507/endocrj.K07E-089.