

Design and Characterization of Gold-Palladium Electrode Platforms for Cancer Detection

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The medical device industry commonly faces limitations in the development of accurate patient monitoring data which ideally could serve physicians as diagnostic tools when fully developed. The field of oncology has had prominent breakthroughs in treatment and diagnostic methods with current technological advancements. Our intention in this research is to develop a cancer-detecting gold-palladium microchip electrode platform. This new cancer detection method is assessed through electrochemical analysis by using telomerase protein activity as a biomarker. Telomerase is known to have high activity in cancerous cell division due to the catalysis of synthesis and extension of telomeric DNA with its RNA template (telomere elongation), playing a key role in the cell immortalization, tumor-genesis (1). In this research project, we assess detection specifically for adenocarcinoma, epithelial cancer. This device not only could serve as a fast adenocarcinoma detection method but as a cancer stage monitoring tool as well. The vision of this project is to create a device that could be easily used by specialized physicians administering patient endometrial tissue samples on-hand and serve pathologists as a method for cancer histological analysis validation. Before analyzing patient tissue samples, we firstly work on developing our cancer detection window with the use of the human adenocarcinoma cell line (HEC-1-A). The creation of this detection window depends on time to detection as wells as the telomerase extract concentration and activity, obtained from HEC-1-A cell culture. Here, we demonstrate the progress of our electrochemical telomerase activity detection method that measures the impedance interfacial change that depends on telomerase extract concentrations and activity.

References:

- (1) Kim, N. W., Piatyszek, M. A., Prowse, K. R., Harley, C. B., West, M. D., Ho, P. D. L., ... & Shay, J. W. (1994). Specific association of human telomerase activity with immortal cells and cancer. *Science*, 266(5193), 2011-2015.