UNIVERSITY OF TEXAS ARLINGTON | OFFICE OF TECHNOLOGY MANAGEMENT

Nano-Scale Biosensor for Gene and Protein Expression Analysis

UTA (08-40 and 14-23)

Technology Need:

The market for portable biosensors on a chip is a growing one that will revolutionize healthcare in developed as well as undeveloped countries. Unfortunately there are a few places that the current devices fall short. Common biosensors use antibody based molecular recognition to detect a specific biomarker. These work well but only in environments where the temperature and humidity, among other parameters, are controlled. Others will use an optics approach that requires a secondary agent, as well as specific knowledge of the interaction between the agent and target proteins or cells to be detected, to function.

Solution/ Offering:

Researchers here at UTA have developed a nano-scale biosensor that has two modes of analysis. The first uses surface tethered hairpin loop oligonucleotide probes to monitor hybridization of target DNA. The second mode is related to the morphological interactions of cells with the aptamer probes. The chip is a sensitive electronic detection device that does not require secondary agents or knowledge of interactions to detect the presence of a protein and/or cell. This nano-array device can also be used for gene and protein expression analysis, monitoring disease progression during/after therapy, forensics, and microbial contamination in food and water sources.

1. M. R. Noor, S. Goyal, S. M. Christensen, S. M. Iqbal, Electrical detection of single-base DNA mutation using functionalized nanoparticles. *Appl. Phys. Lett.* **95**, 073703 (2009).
2. Y. Wan *et al.*, Surface-immobilized aptamers for cancer cell isolation and microscopic cytology. *Cancer Res.* **70**, 9371-9380 (2010).

Value Proposition:

- ✓ High throughput, low power, rapid and cost effective analysis
- ✓ Chip recyclability
- ✓ Cancer or microbial detection
- ✓ Small sample volumes that do not require labeling

Industrial application:

- ✓ Healthcare – Diagnostics, Therapeutics, research
- ✓ Forensics
- ✓ Water and Food Treatment

Patent Status:

- ✓ Patents Granted : US 8283936
- ✓ US Application Filed: 13/081319

Current Stage:

- ✓ Prototype

Meet the Inventor

Dr. Samir Iqbal received his B.E. from the NED University of Engineering and Technology, Karachi, Pakistan and completed his Ph.D. in 2007 at Purdue University. He has been inducted as an Eminent Engineer by Tau Beta Pi, the national Engineering Honor Society, in 2013 and received the Outstanding ACES Mentor Award in 2014 from the Sigma Xi Scientific Research Society.

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