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## Glucose, pH, and Oxygen Triple Sensor

Glucose, oxygen, and extracellular pH are important components of human metabolic processes -- many diseases are associated with glucose transport and metabolic disorders including diabetes and cancer. Monitoring glucose and cell metabolism can provide invaluable information for understanding these diseases.

There are many assays and sensors for glucose, oxygen and pH individually, however none can perform real-time direct assays for all three simultaneously in living cells. Additionally, there are real problems with sensitivities, selectivity, and long term stability in current sensors. Developing a sensor that can dynamically detect the real-time metabolic changes in living organisms could significantly further metabolism related diagnostics, therapeutics and fundamental research.

Researchers at the Biodesign Institute of Arizona State University have developed novel triple sensor compositions that are capable of simultaneously detecting glucose, oxygen and pH in living cells and tissues within complex biological environments. The optical probes (blue for glucose, red for oxygen and green for pH) are chemically grafted or immobilized in a suitable polymer matrix such that leaching of the probes is alleviated, thin film sensing stability is improved and repeatable use of the same sensing films is enabled.

The versatility of these novel sensor compositions allows them to be used for many applications from continuous glucose monitoring to understanding/monitoring cell metabolism during proliferation, inflammation and hypoxia circumstances.

### Potential Applications

- Glucose, oxygen and/or pH sensing in single/multiple/clustered living cells and tissues
- Glucose sensing/monitoring for diabetes management
- Understanding/monitoring cell metabolism under different stimuli and proliferative states
- Diagnosing hypoxia related diseases
- Cancer therapeutic diagnoses

### Benefits and Advantages

- Works with living cells (single, multiple and clustered) and living tissues
- Accurate glucose and oxygen concentration at biological conditions using ratiometric approach for easy/accurate calibration in real time - alleviates the potential influences of the biological environment on the measurement accuracy
- Different fluorophores with well separated emission windows for the different biological parameters

For more information about the inventor(s) and their research, please see [Dr.](#)

Meldrum's directory webpage[Dr. Meldrum's Biodesign directory webpage](#)