

Miniaturised Electrochemical Silicon Biosensor System for the Detection of Triglycerides

Abstract: Electrolyte–Insulator-Semiconductor capacitors (EISCAP) show a shift in the measured capacitance voltage (CV) characteristic with changes in the pH of the electrolyte. Many biological reactions, especially enzyme mediated ones, involve changes in the pH of the electrolyte and an EISCAP can be effectively used for their detection. We started with developing an EISCAP sensor that was able to detect presence of urea in milk and triglycerides (TGs) in blood serum. Miniaturising the sensor to reduce the sample volume and the analysis time led to many unique problems not encountered previously. These include the scaling of the device, choice and integration of the electrode for stable measurements, the enzyme immobilization protocol and the measurements on the miniaturized EISCAP (mini-EISCAPs). A complete biosensor system, using the mini-EISCAPs with an embedded counter electrode and the bio-receptor, including a readout system is discussed. TG concentration in blood serum is estimated using the sensor and compared with clinical results.