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Quartz crystal Microbalance(QCM)-based Immunosensor for the Determination of LDL(Low-Density Lipoprotein)

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Immunosensor for the determination of LDL(Low-Density Lipoprotein) was developed by using quartz crystal microbalance(QCM) system. LDL is known to be a good indicator for the diagnosis of atherosclerosis and hypercholesterolemia. The immunosensor consists of four parts ; detection cell, oscillating circuit, oscilloscope, and frequency counter, and this was interfaced with personal computer for signal processing. The detection cell containing an AT-cut quartz crystal on which gold was coated was connected to oscillating circuit to determine the resonant frequency. Anti-LDL antibody was immobilized on the gold electrode, and resonant frequency(F_0) was measured as a control. LDL was loaded on the antibody-immobilized gold electrode, and frequency(F_1) was determined. The response of the immunosensor ($F_0 - F_1$) was found to be proportional to the LDL concentration up to 500 $\mu\text{g/ml}$. Optimal conditions for the development of immunosensor were also investigated in terms of sensitivity.