Introduction to Biosensors

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Abstrak

As implied in the title of this textbook, Biosensors: From Electric Circuits to Immunosensors , we are going to learn both electric circuitry (in relation to conventional sensors such as temperature sensors) and biosensors (such as antibody-based immunosensors), with equal emphasis on both. The overarching aim is to build an antibody-based immunosensor from scratch. Before we begin this textbook, let us defi ne two important terms: sensors and biosensors. Let us start with sensors.

Literally, a sensor is a device used to sense a physical variable, which includes, but is not limited to: temperature, strain, humidity, pressure, mass, light, and voltage. To sense these variables, we need to convert them into a universal and easily accessible signal— usually a voltage . This voltage signal changes continuously with time, and is directly proportional to a corresponding physical variable.

A component responsible for this conversion is a transducer . The resulting voltage signal is usually an analog signal.

The analog voltage signal is usually transferred to a computer or a microprocessor, which recognizes digital signals only. An analog signal is converted into a series of high and low voltages (i.e., binary numbers), such that a small fl uctuation in the analog signal (i.e., noise) does not affect the overall digital signal. An analog-to-digital converter (A/D converter) performs this conversion. Today, all-in-one type sensors have become very popular. They incorporate a transducer, an A/D converter, a microprocessor, and a small liquid crystal display (LCD) panel. The signal can also be sent to a computer’ s universal serial bus (USB) from an A/D converter.