Integrated temperature control of surface plasmon resonance (SPR) biosensor.

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Abstract

In the current technologic era biosensors are being used largely in different fields of application. Current research trends focuses on the invention of a portable detection system with high sensitivity, accuracy, repeatability and other criteria's relevant to the applications. From all the existing biosensors, surface plasmon resonance (SPR) sensing technology has received continuous attention due to its advantage of a high-sensitivity, label-free and fast response time. Although the SPR sensing technique being legend in the sensor community, currently the temperature of the sample needs to be carefully maintained and controlled because SPR signal varies with temperature. This gives a huge challenge in the application whether the SPR sensor senses only the biological reaction or it detects also the temperature change in the sample. Considering all the challenges, we have developed a novel SPR sensor design having multi SPR channels allowing modulating precisely the temperature of each channel in real-time by using Joule effect. Temperature behavior has been modelled under COMSOL and we experimentally demonstrated that the temperature modulation of SPR channel by Joule effect does not affect the detection scheme; the measurement of air plasmon has been obtained at different temperatures.