

ABSTRACT

APPLICATION OF SURFACE PLASMON RESONANCE PHENOMENON USING OTTO CONFIGURATION METHOD AS CHOLESTEROL FOOD DETECTION IN USED-PALM OIL

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In this thesis, Surface Plasmon Resonance (SPR) using Otto Configuration is rarely used at Material Physics and Instrumentation Laboratory of Gadjah Mada University. Otto configuration is observed at 850 nm in air gap between prism and dielectric layers. This explains that Otto configuration can be used for monitoring cholesterol level in used-palm oil. This experiment shows that Otto configuration method using nanometer air gap can prove the SPR phenomenon. This method uses silver on 15 mg in prism/Ag system which has been coated with half-cylindrical prism to prove the optimum air gap. This optimum air gap becomes the reference for multi-layers thin film SPR phenomenon system in Otto configuration. The multi-layers consist of prism/air gap (850 nm)/used-palm oil/AgNPs@PVA/Ag/air system.

The results of Otto configuration method are analyzed by HeNe laser ($\lambda_0 = 632,8$ nm) in Surface Plasmon Resonance (SPR) system. SPR angle for the prism/air gap/Ag system configured to $(44.4 \pm 0.03)^\circ$ with the reflectance value 0,82 . Due to the addition of AgNPs@PVA (prism/air gap/AgNPs@PVA/Ag system), SPR angle shifts into $(44.6 \pm 0.20)^\circ$ with the reflectance value 0,36 . After the reaction with palm oil (prism/air gap/palm oil (no cholesterol)/AgNPs@PVA/Ag system), SPR angle shifts into $(45,3 \pm 0.30)^\circ$ with the reflectance value 0,46 . Also after the reaction with used-palm oil frying with eggs (prism/air gap/used-palm oil (low-cholesterol)/AgNPs@PVA/Ag system/), SPR angle shifts into $(46.8 \pm 0.70)^\circ$ with the reflectance value 0,36 and used-palm oil frying with quail eggs (prism/air gap/used-palm oil (high-cholesterol)/AgNPs@PVA/Ag system), SPR angle shifts into $(51.0 \pm 0.70)^\circ$ with the reflectance value 0,23 . The shifting on SPR angle using Otto configuration shows the sensitivity of biosensor. It proves to the other experiment that SPR angle in Otto configuration will shift towards greater angle. These experiment results of Otto configuration method become the pioneer for monitoring frying-food cholesterol in used-palm oil.

Keywords : *Surface Plasmon Resonance (SPR), Otto configuration, biosensor, frying-food cholesterol*